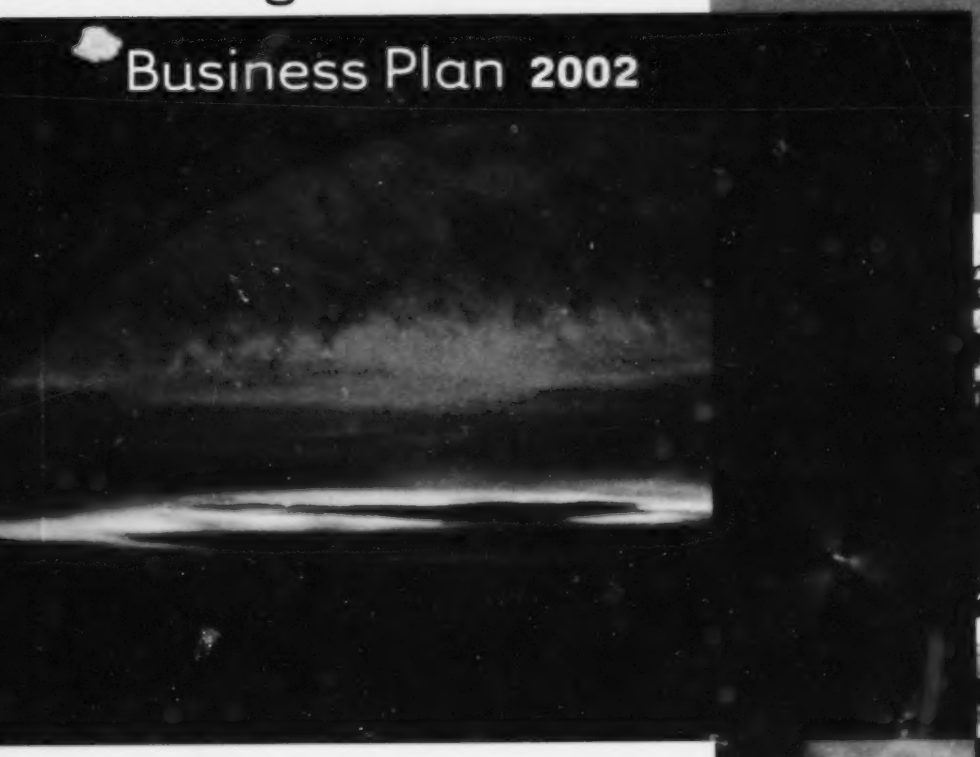
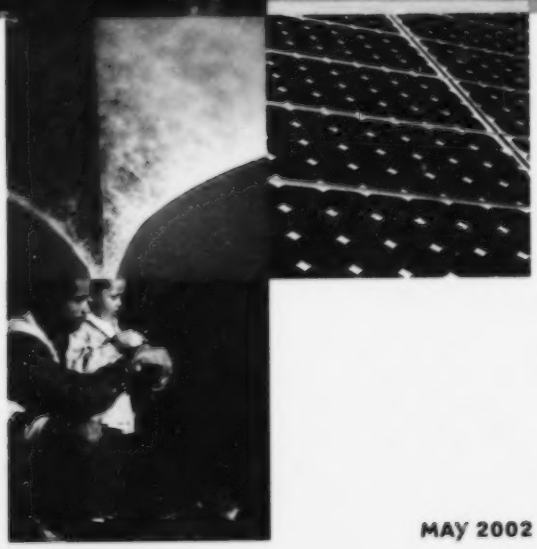
Canada's National Climate Change Business Plan 2002





MAY 2002

National Climate Change Process

ISBN: M171-1/2002E
0-662-32063-8
This publication is also available at **www.nccp.ca**

Ce document est également offert en français sous le titre :
Plan national d'activités 2002 du Canada sur les changements climatiques

103-07120/

Canada's National Climate Change

Business Plan **2002**

MAY 2002

TABLE OF CONTENTS

Preface 2

Section I
Canada's National Implementation Strategy on Climate Change 4

Section II
National Business Planning Process 5
A) Overview 5
B) Process 5
C) Continuous Improvement 6
D) Monitoring and Reporting 7
E) Organizing Actions Under Common Themes 7

Section III
Enhancing Awareness & Understanding 8

Section IV
Promoting Technology Development & Innovation 17

Section V
Governments Leading by Example 24

Section VI
Investing in Knowledge/Building the Foundation 32

Section VII
Encouraging Action to Reduce Emissions 50
A) Sectoral Actions 50
a) Agriculture 50
b) Buildings 56
c) Electricity 63
d) Forestry (Sinks) 71
e) Industry 74
e-i) Minerals and Metals 79
e-ii) Oil and Gas 81
f) Municipalities 84
g) Transportation 87

B) Cross Sectoral Actions: Framework and Partnership Actions 93
a) Voluntary Challenge & Registry 93
b) Baseline Protection Initiative 94
c) GHG Emission Reductions 94
d) Clean Development Mechanisms/Joint Implementation 97
e) Multi-sectoral partnerships 100
f) Health and Well-being 100

C) Cross Cutting Actions 103
a) Sinks 103
b) CO_2 Capture and Geological Storage 103
c) Renewable Energy 104

Appendix A
Canada's GHG Emissions – Current and Projected 105

PREFACE

Climate change is a long term shift in the climate that a given region experiences. It involves changes not only in temperature, but also in wind patterns, precipitation, sea level and storms. The Earth's natural climate has always been, and still is, constantly changing.

The Intergovernmental Panel on Climate Change in its Third Assessment Report (2001) has estimated that:

- Globally averaged surface temperatures have increased by 0.6 ± 0.2°C over the 20th Century.
- Scenarios of globally averaged surface air temperature warming range from 1.4 to 5.8°C by 2100 relative to 1990.
- Globally averaged sea level is projected to rise 0.09 to 0.88 m by 2100.

In 1992, Canada signed the United Nations Framework Convention on Climate Change (the Convention). The objective of the Convention is to stabilize greenhouse gas (GHG) concentrations in the atmosphere at a level that will prevent dangerous anthropogenic interference with global climate systems. Opened for signature at the Rio de Janeiro Earth Summit in June 1992, the Convention came into force on March 21, 1994.

The parties to the Convention judged that initial efforts to achieve stabilization were insufficient and, in 1997, they negotiated the Kyoto Protocol (Protocol), which, if it comes into force, will set binding emissions targets for developed countries and some Economies in Transition, for the five-year period 2008 to 2012. If Canada ratifies the Protocol, it will be required to achieve a reduction in its GHG emissions to six percent below the level recorded in 1990.

Managing the global risks of climate change is an enormous challenge. Each country committed to action is adopting approaches that reflect its geography, the unique structure of its economy and circumstances, and its regulatory and social priorities. Accordingly, while Canada's national circumstances have shaped its strategic interests in international negotiations on climate change; similarly, international developments continue to play an important part in Canada's evolving domestic climate change response.

Immediately after the negotiation of the Kyoto Protocol, Canada's First Ministers agreed:

- that climate change is an important global issue and Canada must do its part and must do so in such a way that no region is asked to bear an unreasonable burden;
- that it is important to achieve a thorough understanding of the impact, the cost and the benefits of its implementation and of the various implementation options open to Canada; and
- to establish a process, in advance of Canada's ratification of the Kyoto Protocol, that will examine the consequences of Kyoto and provide for full participation of the provincial and territorial governments with the federal government in any implementation and management of the Protocol.

First Ministers directed their Ministers of Energy and the Environment to work together to examine the consequences of Kyoto. The ministers agreed to undertake a number of actions to:

- engage governments and stakeholders to examine the impact, the cost and the benefits of the Protocol's implementation and of the various implementation options;
- prepare for the continuing international negotiations on rules to implement the Protocol;
- develop immediate actions consistent with the guiding principles that can be taken to provide early reductions in emissions; and
- begin developing long-term actions that will provide sustained reductions in emissions.

In April 1998, environment and energy ministers established the National Climate Change Process (NCCP). The NCCP has the mandate to consult stakeholders, evaluate mitigation and adaptations options, and produce a national climate change strategy. In October 2000, a major milestone was reached with the completion of Canada's National Implementation Strategy on Climate Change and the First National Climate Change Business Plan.

Completion of this stage of the NCCP required a major collaborative effort by governments to construct an approach for managing climate change risks that reflects the complex nature of the issue, the evolving science, Canada's role in the international community, and the Canadian constitutional framework. This response also reflects an implicit agreement among federal, provincial, and territorial governments about the need to act now and to continue working collectively in a spirit of trust and partnership, and with a clear, common purpose.

National Climate Change Business Plan 2002 demonstrates the continued efforts of Canada's federal, provincial and territorial governments to manage the risks of climate change by taking individual and joint action to reduce emissions, to prepare to adapt to a changing environment, and to encourage and enable action by all Canadians. Building upon the primarily government focus in the First National Business Plan, this Plan reflects the truly national effort underway by also profiling some of the many climate change-related activities planned and underway by the private sector, municipalities and other public organizations not covered by the First National Business Plan.

Canada's National Climate Change Business Plan 2002 is not a summary of the plan that may be required to achieve the Kyoto targets.

SECTION I

Canada's National Implementation Strategy on Climate Change

The National Implementation Strategy is the framework for a coordinated Canadian response to climate change. The national business planning process is an outcome of Canada's National Implementation Strategy on Climate Change, announced by Ministers of Energy and Environment in October 2000. It embodies a fundamental decision by federal, provincial and territorial governments to address the issue of climate change, both by reducing Canada's GHG emissions and by developing strategies to adapt to a changing environment.

The National Implementation Strategy acknowledges that, although climate change poses significant environmental, economic, health and social risks for Canadians, uncertainties remain. Therefore, the Strategy incorporates a risk-management approach to balance uncertainty with the growing need to take action. It enables actions that reduce GHG emissions, promotes the development of adaptation strategies, retains the flexibility to be responsive to scientific and international developments, and allows Canada to position itself to make timely, informed decisions.

Managing risk means applying what has been learned about the causes and impacts of climate change, while positioning Canada to make key decisions as more information becomes available and uncertainties are reduced. For the immediate future, the risk factors include the following:

- environmental, economic, health and social impacts of climate change;
- impacts on Canada of actions by Canada's major trading partners;
- design of major economic instruments such as a domestic emissions trading system;
- pace of development and deployment of new technologies; and
- effectiveness of Canadian mitigation activities in meeting an emissions reduction target.

The National Implementation Strategy provides a multi-phased approach to addressing climate change that includes a sequence of planned decisions and actions guided by the increasing understanding of climate science and international and domestic policy contexts. This approach is intended to signal governments' seriousness about addressing climate change, facilitate action by all Canadians, and allow the analytic and policy framework to continue to inform key issues such as Canada's decision to ratify the Kyoto Protocol.

The intent of Phase One of the National Implementation Strategy is to support actions that are the most cost-effective; that deliver important health, economic, environmental and social benefits; and that prepare for further progressive action. Some actions include opportunities that would otherwise be lost if they are not undertaken during Phase One, or that involve long lead times and require preparation to be ready post-Phase One. This Phase is meant to engage a broad cross-section of Canadians to take action now to reduce Canada's overall emissions and reduce future costs.

Phase One is intended to remain in effect until a decision is made by Canada regarding its ratification of the Kyoto Protocol. If Canada ratifies the Protocol, Phase Two will cover the period from ratification to 2008, the beginning of the First Commitment Period. It will focus on issues such as the implementation of any major economic instruments and other key policy issues including, allocation of responsibility for a national emissions reduction target and the sharing of burden between jurisdictions and sectors of the economy. Phase Three and future phases will encompass Canada's commitment periods and will emphasize meeting reduction targets while responding to evolving domestic and international circumstances.

SECTION II

National Business Planning Process

A) Overview

Under the National Implementation Strategy, Canada's federal, provincial and territorial governments have agreed to develop a series of business plans that will specifically outline actions to be taken individually, in partnership and collectively to respond to climate change. By adopting this approach as the basis for setting priorities, governments can take individual and joint actions that reflect each jurisdiction's priorities and the timing of its decision-making processes. Further, by profiling the range of activities planned and underway in the private and public sectors, the business plans can illustrate the truly national scope of Canada's climate change response.

It is envisioned that the national business plans will continue to evolve annually, looking forward on a three-year basis, and focus on priority theme areas. The First National Business Plan was primarily a government-focused endeavour that used the initial three-year planning horizon to signal areas of policy and program interest, when many governments had yet to make firm policy and program decisions.

The National Business Plan 2002 is intended to build upon the actions of the previous plan and will look forward an additional year, covering the planning period 2002 to 2004. Similar to the first plan, most jurisdictions have identified actions for inclusion within the National Business Plan 2002. Others have adopted the themes and objectives, in whole or in part, and identified their own business or action plans. The National Climate Change Business Plan 2002 is not a summary of the Plan that may be required to achieve the Kyoto objectives.

We have made a special effort in this business plan to capture some of the activities being undertaken by municipalities and the private sector (industry, associations, and Environmental Non-Governmental Organizations (ENGOs)). Although not comprehensive, these actions give a flavour of other activities being undertaken in Canada and form a base for inclusion of a more comprehensive set of actions in the future. For information on other private and public sector activities, see the Voluntary Challenge and Registry Inc. and EcoGESte databases. (http://www.vcr-mvr.ca/) (http://www.menv.gouv.qc.ca/air/changement/ecogeste.htm)

B) Process

As described in the First National Business Plan, the national business planning process is intended to build upon over ten years of progressive action on climate change by all jurisdictions and sectors, including work on energy efficiency, technology development, public awareness, and in particular, the continuous efforts to reduce energy and emissions intensity. Phase One of the National Implementation Strategy is a stage of progressive action to manage the risks of climate change during a period of continuing change in the international and domestic policy context – at this point, the lead up to a decision by many countries on the ratification of the Kyoto Protocol and thus, ultimately, whether the Protocol will enter into force.

The actions identified in the First National Business Plan and this Plan are intended to begin to reduce Canada's emissions growth now, to advance timely and prudent efforts that can reduce the cost of future decisions, to assess impacts, to identify adaptation needs, and to prepare the basis for future decisions through analysis and options development.

Actions will be implemented as individual jurisdictions complete policy and program work and make policy and budget decisions. Each jurisdiction or entity has different budget cycles, and thus the level of preparedness to advance individual action plans varies. The Business Plan presents actions in two categories –"Approved and Underway" representing actions that were approved in 2001 and 2002 and are currently being implemented; and, "Under Consideration" which includes actions that require further evaluation or policy and budget approval.

The actions in this Plan build on the unique regional opportunities, challenges and potential for partnerships of each jurisdiction or sector. They encompass decisions by individual governments or companies regarding their priorities or objectives, which may not directly relate to GHG reductions but may be consistent with other related health, environmental and economic goals.

Similar to the First National Business Plan, this Business Plan is structured to highlight the comprehensiveness of Canada's climate change response, according to both theme and sector. Five overarching objectives continue to guide the types of actions put forth by governments and have been used to organize the private sector actions.

1) **Reduce GHG emissions.**
To take action to reduce GHG emissions despite uncertainty by beginning with "least-cost" actions or those actions that deliver ancillary benefits, and proceed in a fiscally responsible, step-by-step manner towards the objective of sustained net emissions reductions.

2) **Understand the impacts of climate change and develop adaptation strategies and actions.**
To invest in understanding the impacts of climate change in Canada, particularly in the North and other potentially vulnerable regions and, to develop national and regional adaptation strategies and take action to minimize negative impacts and take advantage of opportunities.

3) **Increase Canadians' understanding of the importance of climate change and encourage individuals and businesses to take action.**
To implement a national enhancing awareness and understanding strategy and have governments and industry demonstrate leadership by reducing emissions in their operations and communicate successes.

4) **Position Canada to make decisions at the right time with the right information.**
To invest in knowledge building, such as developing modelling capacity and analyzing domestic and international policy options, that lay the foundation for future actions.

5) **Increase opportunities through technology.**
To promote technology development to help reduce GHG emissions efficiently and provide an opportunity for new business opportunities, high quality jobs, technological advancement, and increased domestic and international market potential.

C) Continuous Improvement

National Business Plan 2002 continues a commitment made by governments to annually identify prospective mitigation, adaptation and knowledge-building actions that reflect their particular economic circumstances, environmental perspectives and overall priorities. Jurisdictions will advance actions that they plan to take individually, in partnership, or co-operatively on a national basis. In doing so, governments have also accepted the following set of common values and standards to guide their efforts:

Shared responsibility and partnership
All jurisdictions will work co-operatively to develop, implement, evaluate and report on business plans and share responsibility for the ongoing success of the business plans.

Respect for jurisdictional decision-making
Each jurisdiction, operating in its own area of competence and authority, decides how it will contribute to the common themes and objectives in the national business plan and reports on its progress. Contributions include those made individually, collectively or in partnership with other jurisdictions or sectors of the economy.

Maximum inclusiveness All orders of government and all sectors of the economy are encouraged to contribute to the national business plan individually, collectively or in partnership. All governments will strive to enable others to take action.

Flexibility Business plans will be flexible in terms of the kind of contributions from governments and all economic sectors.

Dynamic Under the common set of themes and objectives, a business plan is open throughout the year to contributions of actions/measures.

Continual Improvement Business plans will continue to be refined and improved in subsequent years as our knowledge and awareness of climate change increases.

Transparency There will be timely, effective, accessible and open communication about business plans, including clearly defined objectives, measurable progress and regular reporting to the general public.

D) Monitoring and Reporting

Accompanying the business planning process is the ongoing requirement to monitor progress against the overarching objectives and the thematic/sectoral objectives, and to report findings to stakeholders and the public. In September 2001, a first Progress Report of the First National Business Plan was released by Joint Ministers to the public.

Under the United Nations Framework Convention on Climate Change, Canada must also submit and publish annually a national inventory of anthropogenic GHG emissions, as well as report periodically on the progress of policies and actions to mitigate these emissions. The guidelines for the annual National Inventory Report have recently been expanded and now require Annex 1 Parties to the Convention to include explanations of current and long term emission trends, an analysis of the underlying factors and indicators affecting the emission trends, details of the emission estimation methodologies and information on the quality assurance and quality control performed in the preparation of the greenhouse gas inventory.

Many of the new initiatives will need to develop guidance for participants for calculating, reporting and verifying GHG emissions in order to ensure that real reductions are reflected in the national inventory. Moreover, this guidance needs to be consistent with Canada's international reporting obligations to increase its credibility. Ministers of Energy and the Environment agreed to the need to co-ordinate the development of this guidance through the GHG Verification Centre which assists domestic climate change initiatives in the areas of GHG calculation methods, reporting and verification protocols. The GHG Verification Centre is part of the National Inventory group within Environment Canada and draws on the expertise developed in preparing Canada's National Greenhouse Gas Emissions and Removals Inventory.

E) Organizing Actions Under Common Themes

Phase One of the National Implementation Strategy supports actions that either are most cost-effective, deliver important ancillary health, economic and environmental benefits or lay the groundwork for progressive action. The Business Plan is consequently organized around five broad themes that reflect the overarching objectives of Phase One actions. They are:

- **Enhancing Awareness and Understanding;**
- **Promoting Technology Development and Innovation;**
- **Governments Leading by Example;**
- **Investing in Knowledge/Building the Foundation; and**
- **Encouraging Action.**

The proposed categorization is discretionary and the actions are not necessarily confined to just one sector or theme. Some actions cut across themes and sectors. Those actions are expected to be prominent in subsequent business plans. These include actions such as enhanced voluntary action, biological sinks, geological storage of CO_2 and renewable energy (including bioenergy and biofuels).

A brief review and explanation of the themes follows.

Enhancing Awareness and Understanding, for example, would be associated with initiatives focusing on raising public awareness of climate change issues. The coordinated national network of Hubs, an undertaking of the federal and provincial/territorial governments, along with non-governmental and private sector partners, is already engaging the Canadian population.

Promoting Technology Development and Innovation covers a wide range of activities. Research and development in applying new technologies that reduce GHG emissions is prominent. This includes projects for handling carbon dioxide gas streams, alternative fuels and energy sources, and fuel cell technology. Building collaboration in technology development is another important element of the strategy. Collaboration among governments and both private and public sector partners in developing applications of climate change technology will make solutions available to the market more quickly.

Governments Leading by Example addresses GHG emissions associated with government operations. Improving the energy efficiency of public buildings is a major activity for several jurisdictions. Others will advance alternative fuels for government fleets or improve fleet maintenance.

Investing in Knowledge/Building the Foundation incorporates efforts to expand modelling and analytical capacity, to explore policy option development, to enhance climate systems science and to do more research on climate change impacts and adaptation strategies.

Encouraging Action – Sectoral, Cross-Sectoral and Cross-Cutting Actions. This last theme is directed towards emissions reductions.

Most actions and activities can be associated to a specific **Sector** (i.e.: agriculture, forestry, buildings, municipalities, electricity, industry, and transportation) and will be described first.

Other actions are considered **Cross-Sectoral**, promoting actions across a number of sectors. In addition to those actions identified in the FNBP (Enhanced Voluntary Actions, Baseline Protection Initiative, Clean Development Mechanisms and Joint Implementation, Trading of GHG Emission reductions, and Multi-sectoral Partnerships) a new category of actions was added in this section to reflect activities related to Health and Well-being of Canadians.

The FNBP also identified a series of actions that are not, by their nature, unique to a particular sector or theme. These **Cross-Cutting** actions include CO_2 capture, geological storage, and renewable energy.

The following sections of this Business Plan elaborate these themes, highlighting some of the new associated activities that have been introduced since the First National Business Plan. Appendix A, at the end of the report, provides a brief overview of the past, current and projected GHG emissions for Canada.

SECTION III

Enhancing Awareness and Understanding

Canadians continue to have a strong interest in the environment, but their awareness of climate change as a global and national issue that will impact their day-to-day lives remains limited. Under the First National Business Plan, all federal, provincial and territorial governments undertook initiatives to raise the general public's awareness and understanding about climate change, including known causes, effects and actions that can be taken by individuals.

It is essential that Canadians understand the physical manifestations of climate change and the steps they can take to either mitigate the effects or adapt to substantial changes in their living environment. Canadians must also be aware that many of the choices they make on a daily basis will affect Canada's ability to reduce GHG emissions, and in turn, may also influence the economic, health and social standards of the communities in which they live.

Building public awareness and support for climate change policies and actions introduced by governments and the private sector during the different phases of the National Implementation Strategy is critical. The actions and programs in National Business Plan 2002 focus not only on the general public but also on specific target audiences such as youth, educators, business and industry; municipal and community leaders; aboriginal peoples and the media.

One of the primary measures undertaken in the First National Business Plan was the establishment of a national network of Hubs, or regional climate change centres, as recommended by the Public Education and Outreach Issue Table in 1999. Hubs have been established in Alberta, Nova Scotia, the Northwest Territories, Yukon, Saskatchewan, Manitoba and New Brunswick. Newfoundland and Labrador and British Columbia expect to establish Hubs within the business planning period covered by this Plan.

Objectives and Supporting Actions

a) **To build awareness and understanding among Canadians** about climate change, including the science, impacts and adaptation and the associated environmental, economic, human health and social issues.

b) **To develop support from Canadians for policy changes and actions that will be required as part of the National Implementation Strategy.**

c) **To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions**, particularly in support of actions in the business plan.

Over the last year, governments and the private sector continued to develop a number of programs to reinforce the concept of promoting awareness and understanding of climate change. All provinces and territories are currently conducting some form of outreach activity to specific audiences. For example, small and medium-sized businesses have been targeted by Environment Canada in Quebec for knowledge on environmental management activities and Western Economic Diversification is helping businesses take advantage of climate change related opportunities. Manitoba has been providing funding for public education and outreach and other climate change related activities through its Climate Change Action Fund since the beginning of 2001. In the private sector, Epcor and Syncrude are delivering the ABC (Action by Canadians) program to their customers and employees. Atomic Energy of Canada Ltd. is also delivering this program to employees and local communities. Universities are delivering educational programs targeting older students while in Alberta, Evergreen Theatre is delivering a play for students in elementary schools.

Results Anticipated

Investments in education and awareness under the National Business Plan 2002, are expected to have long-term benefits with progress being measured by success in:

- Completion of the establishment of public education and outreach networks begun under the First National Business Plan;
- A measurable increase in participation in focused outreach initiatives;
- A measurable increase in the level of awareness of climate change issues above an established polling baseline; and
- National delivery of climate change education programs.

Actions Approved and Underway

All activities listed are designed to support the following objectives:

Objective: *To build awareness and understanding among Canadians about climate change.*

Objective: *To develop support from Canadians for policy changes and actions that will be required as part of the National Implementation Strategy.*

Objective: *To encourage and motivate Canadians to take personal and corporate action to reduce GHG emissions.*

Action By Canadians on Climate Change [Ref. 2002 - 014] ***Atomic Energy of Canada Limited***

To educate individuals and organizations on the issue of climate change; enhance awareness of the link between climate change, greenhouse gases and energy use; and present actions that can be taken to reduce greenhouse gas emissions. AECL's ABC program has an in-reach component, which involves the delivery of training to employees and an outreach facet, which have included workshops in the communities where the companies are located.

In partnership with the Energy Council of Canada, Enbridge Consumers Gas and Ontario Power Generation.

Health and Socio-economic Impacts of Climate Change [Ref. 2002 - 196] ***Canada***

To assess the health and socio-economic implications of possible greenhouse gas emission reduction measures. This will include methodologies for, and estimates of health and social costs of action and inaction, and will also examine how Canadians react to and understand the effects of climate and of climate change and variability on their health and well-being. (Health Canada)

In partnership with Centre for Population Health Risk Assessment, University of Ottawa, Université Laval Centre de recherche (CHUL), researchers from across Canada, and non-governmental organizations.

Communications [Ref. 2002 - 005] ***Canadian Nuclear Association***

To establish public and policymaker understanding and knowledge of nuclear technology and its significance to greenhouse gas reduction measures. To explain the value of nuclear energy as a cost effective and reliable source of electricity, and non-emitter of greenhouse gases. To educate the public, policy-makers and the media on a factual basis about nuclear energy's potential contribution to providing safe and sustainable energy and electricity to support Canada's objectives to reduce greenhouse gases.

SEEDS Foundation Creating a Climate of Change [Ref. 2002 - 263]

Alberta

Creating a 'Climate of Change' is a comprehensive package of instructional resources for Canadian high school students, including a 54-minute video, teacher's resource guide, transparencies and CD-Rom. This program is designed to encourage critical thinking and the development of strategies, to respond to the prospect of global warming and climate change.

Climate Change Central in partnership with CAPP, SEPAC, CEPA, and CCAF.

Energy Futures [Ref. 2002 - 257]

Alberta

A professional development program on the future of Canada's energy for educators was held in July 2001 through the Foundation for Environmental Learning, with the support of FEESA, an Environmental Education Society. The objectives of the program are to 1) educate the educators about Canada's energy resources and uses, both current and future; and 2) focus on connecting education opportunities and needs and key support mechanisms.

Climate Change Central in partnership with Natural Resources Canada, Petroleum Communications Foundation, Imperial Oil, Syncrude, PanCanadian, Nova Chemicals, Enmax, Enbridge, Ontario Power Generation, Atco, Atlantic Energy Co, Luscar.

Destination Conservation [Ref. 2002 - 041]

New Brunswick

To encourage students and school staff to interact in environmental education and conservation activities. Destination Conservation is a program that provides: 1) information on energy, water and waste reduction opportunities and involves a self-audit of the school; 2) the set up of a monitoring program; and 3) the establishment of conservation action plans. The program is funded by energy savings through a performance contracting arrangement.

NB Natural Resources and Energy, in partnership with Vestar / Destination Conservation. **(2001/02 – $300K)**

Conferences and Workshops [Ref. 2002 - 138]

New Brunswick

To enhance awareness of climate change through the delivery of workshops and conferences by providing support to regional and provincial conferences and workshops.

NB Natural Resources and Energy, in partnership with the Government of Canada and NGO's.

New Brunswick Climate Change Public Education and Outreach Hub [Ref. 2002 - 063]

New Brunswick

To inform, educate and build awareness of the science and impacts of climate change, including the capacity to adapt, and to encourage and motivate New Brunswickers to take personal and corporate actions to reduce GHG emissions. The PEO Hub will co-ordinate climate change education and outreach initiatives, and will play a central role in identifying local gaps in Public Education and Outreach and support activities. **(2001/02 - $182K)**

NB Natural Resources and Energy, in partnership with the Government of Canada, the NB Lung Association, Enbridge Gas NB and NB Power.

Climate Change Information Projects [Ref. 2002 - 139] — ***New Brunswick***

To assist and support organizations seeking funding for Climate Change actions by providing financial and technical advice on projects that contribute to the achievement of climate change. **(Minimum of $5K)**

NB Natural Resources and Energy, in partnership with NB Department of Environment and Local Government, Federal Organizations and the Private Sector.

Access to information relating to climate change [Ref. 2002 - 185] — ***Canada***

To enhance the availability and sharing of scientific and technical information related to climate change, the National Research Council of Canada supported the creation of Canada's Institute for Scientific and Technical Information (CISTI).

Evergreen Theatre [Ref. 2002 - 258] — ***Alberta***

The production of an educational play entitled "Full of Hot Air, The Climate and Weather Show". The goal of the play is to provide elementary students with an understanding of the scientific processes of the weather and climate change, and encourages them to make responsible and informed choices for the world in which they live.

Climate Change Central in partnership with EPCOR.

EPCOR ABC Program [Ref. 2002 - 168] — ***EPCOR Utilities Inc.***

Delivery of Action By Canadians (ABC) climate change awareness workshops. ABC is a national program run by the Energy Council of Canada. EPCOR is innovative in its delivery of the workshops as a customer service. EPCOR will conduct workshops by invitation from community groups in Alberta. ABC has never been delivered this way before. There is follow-up with participants and the national program tracks savings from activities pledged and undertaken.

In partnership with the Energy Council of Canada.

The Active Living and Environment Program [Ref. 2002 - 135] — ***Go for Green***

Go for Green encourages Canadians to pursue healthy, outdoor physical activities that protect, enhance or restore the environment, while diminishing GHG emissions. Winter Green encourages Canadians to participate in outdoor winter activities that protect the environment and also reduce GHG emissions. Ice Dreams encourages and supports the development and use of new and existing outdoor rinks in Canada. Gardening for Life supports natural active gardening, including avoiding the use of pesticides and motorized gardening tools.

In partnership with Health Canada, Compaq Canada Corp., Kodiak Group Inc., National Hockey League, Canoe.ca, The Rink Rake.

Workshops on climate change [Ref. 2002 - 306] — ***Newfoundland and Labrador***

To provide information on local impacts of climate change as well as business opportunities. A series of workshops were conducted in 2001. (Newfoundland Environment Industry Association (NEIA)

Climate Change Education Centre [Ref. 2002 - 304] — *Newfoundland and Labrador*

To provide public information on climate change impacts, mitigation, and other related climate change issues. This initiative is part of the National Education and Awareness Network. (Conservation Corps of Newfoundland and Labrador)

In Partnership with federal and provincial governments.

The Manitoba Climate Change Task Force [Ref. 2002 - 218] — *Manitoba*

To develop a provincial strategy to respond to the challenges and opportunities presented by climate change. Public consultations were conducted through a series of meetings. Findings and Recommendations were submitted to the Government in September 2001.

Manitoba Climate Change Action Fund [Ref. 2002 - 082] — *Manitoba*

The Manitoba Climate Change Action Fund (MCCAF), a component of the Sustainable Development Innovations Fund (SDIF) has $250,000 annually to support projects focusing on: public education and outreach; scientific understanding of climate change impacts and potential adaptation practices; technological innovation (research and commercialization); and, energy efficiency, alternative or green energy. Funding priorities will be reviewed annually.

Climate Change Public Education and Outreach Hub [Ref. 2002 - 113] — *Manitoba*

To disseminate public information on climate change. The Hub is established at Manitoba Eco-Network with sectors including industry, agriculture, universities, health, students, aboriginal organizations and environmental groups. (Manitoba Conservation)

In partnership with Fort Whyte Centre and the Manitoba Eco-Network.

Conference Sponsorships [Ref. 2002 - 058] — *Canada*

To raise awareness and facilitate the discussion and analysis of environmental issues, such as climate change and sustainable development through conference sponsorships. Each year, Western Economic Diversification (WD) allots a funding commitment to each of its four regional offices. The conferences must be shown to be consistent with WD's priority areas of economic impact as stated in its Report on Plans and Priorities.

Integration of climate change into Manitoba Curriculum in Science [Ref. 2002 - 125] — *Manitoba*

To integrate climate change into the Manitoba science curricula in Grade 5 and Senior 2. Manitoba Education, Training and Youth's curriculum development process includes integrating sustainable development and climate change into its curricula wherever appropriate.

Climate Change Learning Resource for Senior 2 Science [Ref. 2002 - 114] — ***Manitoba***

To purchase copies of Inuit Perspectives On Climate Change for all schools with Senior 2 in order to support implementation of the new curriculum. Manitoba Education, Training and Youths submitted a proposal to Manitoba's Sustainable Development Innovations Fund (SDIF) which approved the funding September 27, 2001.

In partnership with the International Institute for Sustainable Development (IISD) and Learning for a Sustainable Future.

Changes to school curriculum [Ref. 2002 - 273] — ***Newfoundland and Labrador***

To enhance awareness and understanding, by changing the Science course for grade 10 students to include 25 per cent of the course content on weather and climate change (Department of Education)

Climate Change Central [Ref. 2002 - 204] — ***Nova Scotia***

To coordinate climate change public education and outreach activities and to act as a catalyst for climate change

Public Education and Outreach in Nova Scotia. A multi-stakeholder climate change hub was established. (Clean Nova Scotia Foundation) **($160K for 18-month pilot)**

In partnership with NS Power Inc., Environment Canada, Exporters and Manufacturers Association, Halifax Regional Municipality, Sable Offshore Energy Project, Heartwood, Ecology Action Centre, School for Resource and Environmental Studies.

Degrees of Variation Climate Change in Nunavut – Poster [Ref. 2002 - 214] — ***Nunavut***

To create a poster that explains climate change and Nunavut-based research. Available in the four official languages, the poster explains climate change and what impacts are predicted to occur in Nunavut.

In partnership with Natural Resources Canada - Nunavut Geosciences Office.

Posting Climate Change Research Reports on the MOE Web site [Ref. 2002 - 249] — ***Ontario***

To search for the most effective ways to reduce emissions or remove greenhouse gases. In 1999, Ontario established the $10 million Climate Change Fund. Over the past three years Ontario has been building a foundation, assessing alternatives, and taking direct action across sectors – government, industry, communities and individuals. The fund has provided support to various partners from Ontario ministries, the private sector and municipalities. It has been fully allocated and projects are to be completed by Spring 2002. As reports are completed and approved for release, they will be posted to the MOE Web site (www.ene.gov.on.ca). (Ministry of the Environment)

Climate Change Information Integration [Ref. 2002 - 043]

Royal Saskatchewan Museum

To integrate information about climate change into existing permanent exhibits. This project will increase awareness of climate change by exploring the issue through an interactive learning centre, gallery theatre, and a series of permanent displays within the museum. **($65K for 2001)**

In partnership with the Federal Government, Saskatchewan Housing Corporation and the private and corporate sponsors.

Educational Programs and Hands-on Exhibits [Ref. 2002 - 056]

Saskatchewan Science Centre

To promote public understanding of climate change using educational programming and hands-on exhibits addressing the underlying reasons for climate change and possible impacts, adaptation, and mitigation.

In partnership with the Government of Canada, SaskEnergy, Wascana Energy and SaskPower.

Climate Change Saskatchewan [Ref. 2002 - 318]

Saskatchewan

To provide climate change information for Saskatchewan people, to help build awareness and understanding of climate change impacts, motivate individuals to action, and develop public support for policy changes geared towards reducing emissions. A Speaker's bureau has been established (www.climatechangesask.ca) and curriculum materials are being produced.

Climate Change Saskatchewan in partnership with the Federal government, industry and many non-government associations and organizations.

Destination Conservation [Ref. 2002 - 319]

Saskatchewan Environmental Society

To direct changes to a school's energy, water and waste systems through educational and technical components. Technical changes are made based on a comprehensive energy audit and analysis of each school in the division. Destination Conservation also offers technical training to custodial and division facilities staff. This training covers energy conservation principles, building management for energy conservation and new technologies, and retrofits.

Saskatchewan Environmental Society in partnership with SaskPower Energy Solutions and SaskEnergy.

Action Plan - Education and Training [Ref. 2002 - 001]

Syncrude Canada Ltd.

To enhance awareness by employees, the community and suppliers. Syncrude is raising awareness of the Climate Change issue and the role of energy use through ABCs of Climate Change workshops with employees and local community members and the introduction of Environmental Supply Chain Management in its activities.

In partnership with the Energy Council of Canada and NRCan.

Communication Initiatives [Ref. 2002 - 057]

Canada

To raise awareness of environmental issues, several communications projects have been undertaken by Western Economic Diversification (WD) through a variety of communications initiatives involving: public outreach; education and public awareness; pilot projects; and supplier development. One of the program's main focuses will be on helping Canadian SMEs take advantage of climate change-related business opportunities through key messages in speaking opportunities and in climate change articles in WD's two publications, (Access West and Points West).

In partnership with Western Canada Business Services Network.

Yukon Public Education and Outreach Hub (Pilot) [Ref. 2002 - 166]

Yukon

To assist communities and institutions to better understand the impacts of climate change and to promote the development of strategies to respond to these changes. The objectives are to: enhance awareness and understanding of the issue; encourage action by all stakeholder groups; build capacity within communities and institutions to respond to climate change; build partnerships among communities and institutions to improve northern capacity to respond to climate change; and provide information through a variety of communication techniques.
(Yukon Energy, Mines and Resources and Yukon Environment) **($45K 2001/02, $85K 2002/03)**

In partnership with the Government of Canada, Northern Climate ExChange, and Yukon College.

Actions Under Consideration

Public Education and Outreach [Ref. 2002 - 302]

Prince Edward Island

To establish a climate change hub that will provide public education and outreach to specific audiences, support and encourage Islanders to take actions to reduce greenhouse gases, and build capacity with local NGOs to conduct climate change public education and outreach activities.

In partnership with the Government of Canada, industry and NGOs.

SECTION IV

Promoting Technology Development and Innovation

The research, development and deployment of efficient, clean, cost-effective technologies are essential elements of Canada's climate change response under the National Implementation Strategy. Canada's technology strategy is designed to ensure that new applications are identified, developed through basic and applied research, and advanced to commercialization where they may be made available for deployment domestically and in international markets.

At the core of this strategy is the recognition that Canada must maximize the use of its national capabilities. The strategy must provide mechanisms that can assess the appropriate measures to promote, develop, finance, and advance to commercialization those technologies deemed to possess the greatest strategic value in meeting national climate change objectives. The categories of endeavour include:

- advocating continuous innovation;
- increasing knowledge infrastructure;
- building focused partnerships among governments and both the private and public sector;
- accelerating demonstration and commercialization of technologies;
- enhancing human resource availability; and,
- ensuring a competitive, domestic and international business environment.

It is important to recognize that technology development takes time. Applications available in the short-term (e.g., for the First Commitment Period under the Kyoto Protocol) are unlikely to come from technology development beginning now. However, in the near term, the prompt deployment of today's best technologies in key sectors of the economy is a viable means to help Canada reduce its GHG emissions, or at the very least, its emissions intensity. Looking forward, the development and demonstration of innovative and cost-effective technologies is broadly recognized as a promising approach to improve our capability to reduce emissions further and enhance business opportunities for Canadian companies.

Objectives and Supporting Actions

a) To foster collaborative efforts and information exchange among governments and stakeholders to advance new and emerging technologies, taking account of domestic and international opportunities.

b) To enhance the knowledge infrastructure through new approaches to providing energy and energy end-use services that ensure innovative technologies are available to meet emissions reduction objectives.

c) To research, develop and demonstrate new and emerging climate change technologies.

d) To enhance the business environment through analysis of the opportunities to advance Canadian technologies and enrich the innovation system.

New, progressive initiatives announced by governments and industry will play an important role in continuing progress in many of these areas and providing additional focused support for climate change technology projects. Specifically, research will continue in the development and use of supplementary cementing materials; the use of biotechnologies for the production of bio-energies; and the development of polymer composites for use in the automobile manufacturing industry. Other research initiatives include ethanol blending in diesel fuel, hydrogen as a transportation fuel, and the further development and promotion of hybrid vehicles. The rail industry is also studying the use of lubricants and friction modification agents to reduce their energy requirements.

Other examples of specific activities that will directly or indirectly make significant contributions to reductions of GHG emissions include the development of software tools for building designers; research in automated anode replacement system for the aluminum industry; improvements in blade-manufacturing technology for wind turbines; and efficiency improvements for food-cooling products and water purification technologies.

Results Anticipated

A number of positive results could be anticipated from implementation of the technology strategy. These include:

- Advancement of new environmentally-responsible technologies;
- Formation of intergovernmental partnerships to foster development of technologies of mutual interest;
- Enhanced economic opportunities for Canadian companies;
- Increased investment in the private and public sector;
- Reinforced partnerships among industry, government and academia;
- Better alignment with the private sector in addressing climate change issues; and
- Steady progress towards achieving sustainable emission reductions.

Actions Approved and Underway

Objective: *To foster collaborative efforts and information exchange among governments and stakeholders to advance new and emerging technologies, taking account of domestic and international opportunities.*

National Research Council (NRC) Fuel Cell Program [Ref. 2002 - 177] — *Canada*

To create and demonstrate fuel cell and clean energy technology for Canada. Transfer of technology to Canadian industry and government. This technology will provide substantial reductions of greenhouse gases.

In partnership with universities across Canada and multiple Canadian fuel cell companies.

Fostering Partnerships Through Networks and Workshops [Ref. 2002 - 313] — *Canada*

To exchange information and ideas, to promote collaboration in CO_2 management, eco-sustainable communities, and process integration for energy efficiency, and to create technology networks of experts from industry, the research community and governments (an Action Plan 2000 initiative). Strategic planning workshops will be held for researchers and decision-makers from industry, the research community, and governments to exchange information on recent technology developments and help guide innovation investments. (NRCan) **($1.2M over 5 years)**

Iter Fusion Energy Research Project [Ref. 2002 - 007] — *Iter Canada*

To develop fusion energy as the way to a clean and sustainable energy source. Fusion energy is greenhouse gas free. Iter is an international project and this international research facility is an important next step toward meeting a large share of the planet's future energy requirements. **(2001/02 - $10M)**

In partnership with the governments of Canada, Ontario, Regional, Municipal, Universities, Labour Unions, Financial Institutions, Ontario Power Generation and Engineering Construction Companies and other private sector members.

Hydrogen Development [Ref. 2002 - 124] — *Manitoba*

Coordinated by the Manitoba Energy Development Initiative, a provincial hydrogen steering committee has been established to assess hydrogen economic development opportunities for Manitoba. Participation includes 3 levels of government, Manitoba Hydro, AECL, industry and the academic community.

(Manitoba, Industry, Trade and Mines).

Objective: *To enhance the knowledge infrastructure through new approaches to providing energy and energy end-use services that ensure innovative technologies are available to meet emissions reduction objectives.*

Institute for Research in Construction [Ref. 2002 - 181] — *Canada*

To promote climate change technology development and innovation in the construction industry, combine the efforts of National Research Council (NRC) and the North American Roofing Community to evaluate performance of rooftop gardens in our climate, carry out generic, pre-competitive research of benefit to the construction community and provide unbiased performance results from an independent source for all developed products.

In partnership with Oak Ridge National Laboratory (ORNL), Canadian Roofing Contractors Association (CRCA), Roofing Consultants Institute (RCI), Bakor, EMCO, Garland, Hydrotech, IKO, Soprema and Tremco.

Climate Change Technology Roadmaps (TRMs) [Ref. 2002 - 153] — *Canada*

To determine future market needs, promote collaboration, and plan the best approach to advancing promising climate change technologies in various sectors (an Action Plan 2000 initiative). Participants from government, industry, academia, and the supply chain will work together to identify sector needs in the future and to outline the technological advances required to meet those needs. (Industry Canada)

Efficiency and Renewable Energy Pilot and Demonstration Projects [Ref. 2002 - 284] — *Yukon*

To determine the viability and appropriateness of efficiency and renewable energy technologies in subarctic climates for broader commercial applications. Two projects are underway: a pilot project for a ground source heat pump installation in a Whitehorse aquifer to heat a local high school; and a residential air-to-air heat pump demonstration project. (Yukon Development Corporation).

In partnership with the Canada-Yukon Energy Solutions Centre.

Canada-Yukon Energy Solutions Centre [Ref. 2002 - 282] — *Yukon*

To provide technical services and facilitate energy solutions for residential, commercial, and government consumers. The objectives are to: increase public awareness and economic benefits of energy efficiency and renewable energy technologies, increase public participation in existing programs to enhance energy efficiency and use of renewable technologies, facilitate the development of green power infrastructure, and share information about community-based energy management. (Yukon Development Corporation) **(2002 - $1.7M, 2003 - $2.6M, 2004 - $1.7M)**

In partnership with the Government of Canada.

Objective: *To research, develop and demonstrate new and emerging climate change technologies.*

Technology Partnerships Canada (TPC) [Ref. 2002 - 188]

Canada

TPC's mandate is to make high-risk, repayable investments in near-market product and process technology development. The fund contributes to increased economic growth, job and wealth creation, and supports sustainable development. TPC invests strategically in research, development, and innovation to encourage private sector investment and maintain and grow the technology base and technological capabilities of Canadian industry. (Industry Canada)

TPC works in partnership with members of the Industry Portfolio and with provincial governments, academia, industry associations and a wide range of private sector clients.

Novel Next Generation Technology Initiative to GHG Mitigation [Ref. 2002 - 197]

Canada

To develop new and fundamentally different concepts and ideas, which could lead to novel GHG mitigation technologies in the medium to long term through early stage, exploratory research in energy, energy products or end-use efficiency. This Action Plan 2000 initiative targets (through NSERC) researchers in natural sciences and engineering in universities and colleges, and (through Natural Resources Canada) researchers in federal and provincial science-based departments and agencies. (Natural Resources Canada)

R&D for Innovative GHG Reduction Technologies [Ref. 2002 - 314]

Canada

To promote innovative technologies, this Action Plan 2000 initiative consists of 11 projects, balanced between short-term and long-term R&D, and between various industry sectors. The projects focus on oxygen/carbon dioxide recycle combustion, advanced power cycles, distributed power systems, sequestration of CO_2 in oil sands tailings and gas hydrates, electricity generation from agri-food, municipal wastes and landfill gas, increased energy efficiency through refined multiphase granular flow processes, gas flaring, electricity from fuel cells using hydrogen derived from bio-solids, and sustainable community designs. (Natural Resources Canada)

(2001/02 - $1.6M ; 2002/03 - $2.3M ; 2003/04 - $2.2M ; 2004/05 - $1.7M ; 2005/06 - $1.5M)

Ecosmart Building Design - Sustainable Building Prototype [Ref. 2002 - 159]

Canada

To design and build a marketable prototype building that demonstrates sustainability principles and technologies. (Industry Canada)

In partnership with the Greater Vancouver Regional District (GVRD), Busby and Associates Architects.

Institute for Biological Sciences [Ref. 2002 - 183]

Canada

To develop viable biotechnology and biocatalysts for the production of renewable bio-energy from biomass contributing to the reduction of the use of fossil fuel and the emission of greenhouse gases. This initiative would exploit the vast resources of cellulose in Canada, and develop the expertise of biocatalysts (enzymes) in NRC, in two forms: cellulosic ethanol and bio-fuel.

Development of Lightweight Materials for Vehicles [Ref. 2002 - 180]

Canada

To develop lightweight materials to improve energy efficiency of vehicles: project goal is to develop a prototype on-line ultrasonic liquid metal cleanliness analyzer, which detects and counts the inclusions in liquid magnesium. Ultrasonic technology is chosen because of its sensing capability in liquid magnesium, simplicity, versatility and cost effectiveness. Testing of the technology will be carried out at industrial partners' plants and compared with off-line techniques. (National Research Council)

In partnership with Industrial members of CLIMRI such as Noranda, Timminco, Meridian, Haley and other partners.

Optimising the Roll-forming Process [Ref. 2002 - 179]

Canada

To develop and optimise the roll-forming process for continuous glass fibre/polypropylene thermoplastic composites and their sandwich structure. Polymer composites, as structural and aesthetic materials, are now recognised to be very important for the transportation industry (automotive, truck, bus and railways). The advantages they provide are mainly a significant weight reduction (up to 40% in comparison with conventional metals) and flexibility in design, reducing machining time and cost. (National Research Council)

In partnership with D.W. Gill Supply, Pulltral ADS Group and École Polytechnique.

Hydraulics Projects [Ref. 2002 - 178]

Canada

The Canadian Hydraulics Centre (CHC) works extensively with both the public and private sectors on problems associated with the design and maintenance of coastal infrastructure. CHC has extensive expertise in the simulation and engineering assessment of coastal, estuarine and hydrodynamic processes. In addition to engineering R&D expertise, the special hydrodynamic software packages and visualization and animation tools CHC has developed are well-suited to the challenges presented by climate change, including sea level rise affecting coastal areas, rainfall and runoff changes on watersheds, floods and droughts, weather pattern changes, etc. (National Research Council)

In partnership with a number of Canadian universities.

Ethanol Blended Diesel Fuel Demonstration [Ref. 2002 - 120]

Manitoba

Six month trial of ten buses using ethanol blended diesel fuel or e - diesel. Manitoba Conservation is the project facilitator. Project partners include Husky Oil Ltd. and City of Winnipeg Transit. A 3.5 per cent to 4.5 per cent reduction in greenhouse gas emissions is expected.

In partnership with Husky Oil Ltd. and City of Winnipeg Transit.

Hydrogen Opportunities [Ref. 2002 - 123]

Manitoba Hydro

Manitoba Hydro has formed an internal taskforce to study opportunities relating to hydrogen (e.g. hydrogen production methods, hydrogen markets). Members of this task force will be participating in the Manitoba Hydrogen Steering Committee working groups.

In partnership with Manitoba Conservation, Manitoba Industry, Trade and Mines.

Wind Monitoring Program [Ref. 2002 - 332] *Manitoba Hydro*

Manitoba Hydro and Manitoba Conservation are jointly funding a $150,000 wind monitoring program for 2002/2003. Four sites in Manitoba will be selected and monitored for one year.

In partnership with Manitoba Conservation.

Micro Hydro [Ref. 2002 - 333] *Manitoba Hydro*

The Manitoba Government, through Manitoba Hydro, is participating in a $1.7 million project to study the economics of building and operating micro hydro in all four of Manitoba's "diesel" (off-grid) communities. The Keewatin Tribal Council is spearheading this project. INAC is also a partner.

In partnership with the Manitoba Government, Keewatin Tribal council, and INAC.

Cypress Wind Power Project [Ref. 2002 - 320] *Saskatchewan*

To harness the wind to generate clean, renewable electricity. The Saskatchewan Government's commitment to buy wind power for its facilities will allow SaskPower to harness the wind to generate a power supply for the Corporation's head office and eventually offer a green power product option to all Saskatchewan residents. The University of Regina is SaskPower's first commercial business Green Power customer, agreeing to purchase Green Power for the new Greenhouse Gas Technology Centre on campus.

SaskPower in partnership with Vestas Canadian Wind Technology, Hitachi Industries

Yukon Hydrogen Project [Ref. 2002 - 289] *Yukon*

To examine the feasibility of hydrogen production, storage, and transportation, as well as other potential applications, using surplus hydroelectricity from the Whitehorse-Aishihik-Faro grid. Various demonstration projects are under review including off-grid camps, displacement of diesel-generated electricity in rural communities, heavy equipment and related mining applications, fleet vehicles including public transit, remote stand alone system and winter peak power generation. (Yukon Development Corporation)

In partnership with Yukon Energy Corporation.

Objective: *To enhance the business environment through analysis of the opportunities to advance Canadian technologies and enrich the innovation system.*

Next Generation CANDU Design Study [Ref. 2002 - 012] *Atomic Energy of Canada Limited (AECL)*

To develop a design concept for the Next-Generation (NG) CANDU nuclear power plant. The NG CANDU program is aimed at developing and confirming key innovating technologies, and applying these to the design for a next-generation family of CANDU nuclear power plants. Key technologies have been carefully assessed, and the nominal design concept for a 600 MWe class NG CANDU nuclear power plant has been established to confirm concept practicality. Continuing work is aimed at the ambitious capital cost target reduction.

In partnership with Commercial partners.

Sustainable Technology Manufacturing [Ref. 2002 - 182] *Canada*

The Institute for Chemical Process and Environmental Technology (ICPET) develops chemical process technologies and value-added materials to help Canadian industries improve the commercial viability of their products, reduce costs, manage environmental performance and increase the efficiency of process. The Sustainable Technology Office is (i) developing and applying impact assessment methods to determine the climate change footprint of a technology, and (ii) designing methods to optimize products or processes to reduce this footprint. (National Research Council)

Actions Under Consideration

Objective: *To research, develop and demonstrate new and emerging climate change technologies.*

CO_2 Capture and Use in Enhanced Oil Recovery [Ref. 2002 - 002] *Syncrude Canada Ltd.*

To develop a feasibility analysis and full cost estimate for a demonstration project to capture pure CO_2 from oil sands project for use in enhanced oil recovery. This proposal would capture 1.8 MT per year of pure CO_2 from Syncrude and Suncor and transport it to fields in Alberta for enhanced oil recovery.

In partnership with Suncor – Federal and Provincial Governments and oil company owners of EOR.

Action Strategy for Greater Montréal [Ref. 2002 - 162] *Canada*

One objective of the Strategy is to develop Montréal as a centre of excellence in the environmental field. The Strategy invests in the development, demonstration and commercialization of environmental and biotechnology solutions in a variety of priority areas, including some that support climate change objectives such as: site remediation; alternative vehicle technologies; urban waste management; and use of satellite data to monitor air, water and land conditions. (Economic Development for Québec)

Top of Rail (TOR) Lubrication System [Ref. 2002 - 170] *The Railway Association of Canada*

To explore whether significant reductions in energy and improved lateral load/curving performance can be obtained through proper application of lubricants. The project involves the application by lead locomotive of lubricants and friction modification agents to the top of the rail. The lubrication, dispensed from a nozzle, optimizes the reduction of tractive force needed for every speed, direction and angle of motion. Other dispersal mechanisms involve wayside spraying of the lubricant. Lubricant/ agent has benign environmental impact.

In partnership with Canadian National Railways and Canadian Pacific Railways.

SECTION V

Governments Leading by Example

Governments and their individual departments at all levels across Canada have been working to develop and implement plans that strive to reduce emissions from their operations. The general objectives and types of results anticipated for government initiatives in this category remain the same as in the First National Business Plan and are listed below.

Governments are building on current action by demonstrating the range of actions available and exploring new and innovative ways to reduce emissions. Sharing these examples with all levels of government and with other interested parties can reinforce communications and trigger actions from commercial and industrial stakeholders and individual Canadians.

In some cases, governments go beyond taking cost-effective actions within their own operations. Through procurement decisions and support for other services (schools or other institutions) they are broadening their influence. Governments are also supporting emerging technologies or practices, going beyond the purely cost-effective, in order to encourage market development.

Objectives and Supporting Actions

a) To demonstrate leadership by:

- taking actions which reduce GHG emissions in their own operations, including those that go beyond low cost effective actions;
- incorporating the strategic consideration of climate change impacts on new policies, programs and projects; and
- developing comprehensive action plans that qualify for the highest level with VCR Inc./ÉcoGESte, setting an aggressive target for reductions, and reporting on progress.

b) To catalyze demonstration and deployment of new and promising GHG reduction technologies.

c) To develop and share expertise within and among governments.

d) To extend awareness and expertise throughout government organizations.

GHG emission reductions are an explicit goal in many government programs, such as the Federal Government's House In Order (FHIO) Initiative that was launched in 2001 or the various federal and provincial/territorial or local government action plans submitted to the Voluntary Challenge and Registry Inc. (VCR Inc.) or ÉcoGESte in Quebec. The Federal Government, British Columbia and Alberta earned Gold-level Reporter status for their 2001 submissions to VCR Inc.

Other provincial and territorial GHG-reduction initiatives include the Nova Scotia House in Order Program to implement aggressive energy performance criteria for all new public buildings that the province funds. In addition, Nova Scotia's Public Building Initiative seeks to reduce energy use in existing provincially owned and operated buildings by an average of 25 per cent through the use of Energy Service Companies. Manitoba has introduced an Hybrid Vehicle Pilot Program for its government fleet and British Columbia has included plans to purchase or lease hybrid electric vehicles this year for use in various department fleets.

The New England Governors and Eastern Canadian Premiers adopted a Climate Change Action Plan in August 2001. The action plan is intended to reduce the region's GHG emissions and to build the foundation for a longer-term shift to cleaner and more efficient ways of using energy, as well as identifying and adopting adaptive measures. The action plan includes a commitment to reach reduction targets for the region of 1990 emission levels by 2010 and at least 10 per cent below 1990 emission levels by 2020. The plan also includes actions directed at promoting public education, governments leading by example and the establishment of a regional standardized inventory and regional emissions registry.

On the municipal front, cities are purchasing green power for specific facilities or systems. For example, the city of Calgary is purchasing 21,000 MWh of wind-generated electricity each year to power the city's light rail transit system (the C-Train). Calgary Transit's Ride the Wind initiative offsets fossil fuel generation and provides the region's citizens with a very visible GHG emissions reduction. Calgary has also recently installed solar panels to heat its municipal bus garages. (More details on GHG reduction efforts at the municipal level can be found in the Municipalities section of this Business Plan)

The primary objective of Environmental Management Systems (EMS) is not the reduction of GHG emissions. However, reductions in energy requirements do result in GHG emission reductions, as a co-benefit of greener government operations. For example, Sustainable Development in Government Operations (SDGO) is a federal government-wide initiative to coordinate the federal effort to green government operations. SDGO's Action Plan calls for moving forward to achieve targets of reduced ecological footprint of federal operations, and will result in fewer GHG emissions.

Other Federal initiatives that will produce tools and indicators to assist in policy-making for climate change include the Canadian Information System for the Environment and the Environment and Sustainable Development Indicators. The latter is a program to develop indicators to promote integration of environmental considerations into economic decisions.

Results Anticipated

- Actions taken by governments will reduce GHG emissions in government operations;
- The establishment of links between governments and the sharing of experiences will avoid duplication of efforts;
- Those actions will;
  - encourage other sectors to reduce their emissions;
  - promote the development of new technologies; and
  - demonstrate additional benefits, including reduced operating costs, economic development, and reduction of other pollutants.

Actions Approved and Underway

Objective: *To demonstrate leadership.*

Energy Saving Measures [Ref. 2002 - 174]

Canada

Since 1989, the National Research Council has shown leadership in pursuing energy efficiency programs including energy performance contracts using third party financing, internally funded energy saving projects, and alternative ways of producing energy to reduce emissions. NRC's Administrative Services and Property Management Branch (ASPM) has initiated a number of activities to provide energy saving tips for the office, at home and on the road.

The Manitoba Conservation Vehicle Replacement Program [Ref. 2002 - 220]

Manitoba

To increase the efficiency of the Government of Manitoba fleet to reduce operating costs and tailpipe emissions. The Department of Conservation is committed to replacing all vehicles (due for replacement) with the most fuel-efficient vehicles that will still adequately do the job required. Downsizing possibilities are investigated, as well as replacement with alternative fuel vehicles, including hybrid electric-gasoline or electric-diesel vehicles.

Sustainable Development Financial Management Guidelines [Ref. 2002 - 097]

Manitoba

To consider a sustainable development impact analysis, (including climate change as a priority area) in all financial management processes, budget estimates, Treasury Board and Cabinet submissions, departmental policies and inter-governmental agreements. Manitoba is committed to promoting and incorporating the Principles of Sustainable Development into all facets of government activity. (Manitoba Conservation)

Yukon Development Corporation – Voluntary Challenge Registry Reporting [Ref. 2002 - 293]

Yukon

To track and report the efforts of the Yukon Development Corporation and its subsidiaries (Canada-Yukon Energy Solutions Centre and Yukon Energy Corporation), to the Voluntary Challenge and Registry Inc. The October 2001 submission was its first to VCR Inc. and reported on its total greenhouse gases emissions since 1990. It established clear performance indicators and commits to annual progress reports. (Yukon Development Corporation) **($5K)**

In partnership with the Canada-Yukon Energy Solutions Centre and Yukon Energy Corporation.

Sustainable Development Code of Practice [Ref. 2002 - 096]

Manitoba

To provide assistance in integrating sustainable development into Manitoba Government decisions, actions, and operations. The Code of Practice is designed to assist in integrating sustainable development in provincial public sector organizations. The Code states that the decisions and activities of the public sector shall strive towards a number of sustainable development principles, a number of which refer to the conservation of renewable and non-renewable resources that would lead to reduced greenhouse gas emissions. (Manitoba Conservation)

Energy and Environmentally Efficient Design for New Red River College Princess Street Campus [Ref. 2002 - 093]

Manitoba

Red River College Princess Street campus is being constructed to have improved energy efficiency through an integrated design process involving consultants and simulations to achieve high-energy efficiency targets. The building is expected to be partially open in September of 2002 (Phase 1).

In partnership with Red River College. (Manitoba Transportation and Government Services)

Manitoba Government Buildings Initiative [Ref. 2002 - 078]

Manitoba

To increase the energy efficiency and water conservation in Manitoba's 78 provincially owned Government buildings. Phases 1 and 2 involved retrofits to two Manitoba Government Buildings: Recent retrofit work includes the Assiniboine Community College Brandon campus and the Red River Community College Notre Dame campus.
(Manitoba Transportation and Government Services) **(2001/02 - $600K ; 2002/03 - $1.5M)**

Transportation GHG Strategy and Action Plan [Ref. 2002 - 173]

Manitoba

Greenhouse gas reduction strategy and plan for reducing emissions in government operations and in the transportation sector. (Manitoba Transportation and Government Services)

New England Governors and Eastern Canadian Premiers – Leading by Example Work Group [Ref. 2002 - 079]

New Brunswick

To establish a working group under the New England Governors and Eastern Canadian Premiers (agreement) Action Plan on Climate Change to identify areas where the respective jurisdictions can cooperate on leading by example initiatives. This will be accomplished through surveys and reporting mechanism. The objective of the Working Group is to identify where regional coordination can lead to advances in government's internal climate change activities.

In partnership with the other Atlantic Provinces, Québec and the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Environmental Assessment Process [Ref. 2002 - 270]

Newfoundland and Labrador

To reform the Environmental Assessment Process to take account of the environmental impacts of development projects, including related GHG emissions. (Department of Environment)

Strategic Environmental Review for Cabinet Papers [Ref. 2002 - 271]

Newfoundland and Labrador

To undertake a review of the process in order to include and take account of environmental and climate change impacts in policy, planning and program decisions. (Cabinet Secretariat)

Climate Change Action Plan 2001 signed with the New England Governors and Eastern Canadian Premiers Parties [Ref. 2002 - 272]

Newfoundland and Labrador

A plan in which the parties committed to: regional GHG emissions inventory and registry; public awareness programs; GHG reduction measures for the electricity and transportation sectors; energy conservation programs; reduction and adaptation of negative social, economic and environmental impacts; and, exploration of regional emissions trading mechanism. (Intergovernmental Affairs, Department of Environment and Department of Mines and Energy)

Nova Scotia Government House in Order Program [Ref. 2002 - 203]

Nova Scotia

To encourage other energy end use sectors to implement energy efficiency and renewable energy measures by demonstrating a proactive leadership role in the public sector. Adoption of an aggressive energy performance criteria for all new public buildings funded by the province – currently set at 25 percent below the MNECB, and implementing Nova Scotia's Public Building Initiative which seeks to reduce energy use in existing provincially owned and operated buildings by an average of 25 percent through the use of Energy Service Companies. (Natural Resources)

In partnership with Nova Scotia's building design, the construction industry, the Federal Government, and Energy Service Companies.

NEG/ECP Climate Change Action Plan [Ref. 2002 - 298]

Prince Edward Island

To implement the New England Governors/Eastern Canadian Premiers (NEG/ECP) Climate Change Action Plan 2001. The plan includes: a comprehensive and coordinated regional approach to reduce greenhouse gases; a commitment to reach specified reduction targets for the region as a whole; and a commitment from each state and provincial jurisdiction to carry on its own planning for greenhouse gas reductions, with a coordinated process that includes disclosure of our progress, and a sharing of information, including case studies of how various programs are working.

In partnership with the other Atlantic Provinces, Québec and the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Climate Change Strategy and First Business Plan [Ref. 2002 - 211]

Nunavut

To develop a GHG control and impact adaptation strategy suitable for Nunavut. To develop a fair, cost-effective and comprehensive GHG emissions control and impact adaptation strategy.

In partnership with the Government of Canada and NTI.

Yukon Climate Change Action Plan [Ref. 2002 - 009]

Yukon

To set an example by providing a document of Yukon's Climate Change Actions. (Yukon Energy, Mines and Resources and Yukon Environment)

In partnership with Yukon Development Corporation, Northern Climate ExChange, City of Whitehorse, Yukon Chamber of Commerce, Yukon Conservation Society.

Provincial Buildings Initiative [Ref. 2002 - 080] — ***New Brunswick***

To improve the efficiency of energy use in government owned facilities through assistance to government departments for the Implementation of energy retrofits using energy performance contracts. **(2001/02 – 35K)**

Enhanced Energy Accounting [Ref. 2002 - 003] — ***New Brunswick***

To provide government building managers with energy accounting information that will allow for better management of energy use, such as tracking progress and/or anomalies. Over 1,000 electrical accounts are tracked and reported monthly. (NB Natural Resources and Energy) **(2001/2002 - $20,000)**

Objective: *To catalyze demonstration and deployment of new and promising GHG reduction technologies.*

Hybrid Vehicle Pilot [Ref. 2002 - 026] — ***Yukon***

To study the applicability of hybrid vehicle use in northern conditions, by conducting trials of a hybrid gasoline/electric vehicle in the government fleet. (Yukon Infrastructure)

The Hybrid Vehicle Pilot Program [Ref. 2002 - 221] — ***Manitoba***

Currently leasing and operating two hybrid electric passenger vehicles, documenting their performance, and making the information available on the web and during 2001 at public events. (Manitoba Conservation)

Objective: *To develop and share expertise within and among governments.*

Fuel Efficiency Driver Training Program [Ref. 2002 - 066] — ***Alberta***

To partner with the Alberta Motor Association (AMA) in developing and delivering of a comprehensive driving course focused on fuel efficiency. This one-day course incorporates classroom and in-car driving components. The vehicles used are equipped with specialized fuel consumption data monitoring system. Alberta transportation and the AMA will promote this course to other government departments-public agencies and large provincial private sector fleets.

Roadway Lighting Energy Conservation Program [Ref. 2002 - 068] — ***Alberta***

To conduct a study of Alberta roadway lighting to identify opportunities for electricity conservation. In conjunction with partners, a study will be undertaken to determine potential energy savings through lighting improvements, and gauge municipal interest in participating in energy retrofits of their roadway lighting, where efficiencies can be achieved.

Alberta Transportation in partnership with Alberta Municipal Affairs, Alberta Urban Municipalities Association, Alberta Association of Municipal Districts and Counties, and ENMAX.

Objective: *To extend awareness and expertise throughout government organizations.*

Reduce Idling in Government Vehicles [Ref. 2002 - 028] — *Yukon*

To encourage thinking about how we use our vehicles, at work, at home, and, in particular, focusing on engine idling and its effects, through an information campaign. (Yukon Infrastructure)

Energy performance contracts for government funded facilities [Ref. 2002 - 307] — *Newfoundland and Labrador*

Completed to date are 80 per cent of health care institutions, 50 per cent of government buildings and 30 per cent of schools. (Education, Health & Community Services, and Works, Services, and Transportation)

Actions Under Consideration

Objective: *To demonstrate leadership.*

Sustainable Development Procurement Action Plans [Ref. 2002 - 098] — *Manitoba*

Departmental Implementation of Manitoba government procurement guidelines. Departments following these guidelines would reduce greenhouse gas emissions through the conservation of energy and the reduction of waste. (Manitoba Conservation)

Sustainable Development Procurement Goals [Ref. 2002 - 099] — *Manitoba*

To provide goals, quantifiable objectives, strategies, and recommended action, to meet the intent of the Sustainable Development Procurement Guidelines. The goals (increased energy efficiency, decreased use of fossil fuels and solid waste production) are achievable through the efforts of all departments and provide a general statement of desired results to pursue sustainability through government's purchases and practices. (Manitoba Conservation)

Sustainable Development Procurement Workshops [Ref. 2002 - 100] — ***Manitoba***

To assist government departments in implementing the Sustainable Development Procurement Guidelines through workshops aimed at increased energy efficiency, decreased use of fossil fuels and decreased solid waste production. (Manitoba Transportation and Government Services)

In partnership with the Center for Indigenous Environmental Education (CIER).

"House in Order" Strategy [Ref. 2002 - 269] — ***Newfoundland and Labrador***

To form a departmental committee for planning and implementation of in-house measures. Some of the proposed measures are (1) establishment and reporting of GHG reduction targets for government operations, (2) demonstration and deployment of promising GHG reduction measures, (3) introduction of a Green procurement program, and (4) introduction of fuel conservation measures for provincial ferry fleet. (Department of Works, Services and Transportation)

Objective: *To develop and share expertise within and among governments.*

Government Fuel Efficiency Vehicle Procurement Program [Ref. 2002 - 067] — ***Alberta***

To improve the overall fuel efficiency of the Alberta Government fleet. This proposed program would implement a best-in-class fuel efficiency criterion through the current government lease processes. (Alberta Transportation) In partnership with leasing companies.

SECTION VI

Investing in Knowledge/Building the Foundation

Managing uncertainty and risk are fundamental requirements of Canada's National Implementation Strategy on Climate Change. Striking the appropriate balance between uncertainty and the need to take action enables progress to be made in mitigating GHG emissions and developing adaptation strategies, while retaining the flexibility to respond to evolving science and our increasing knowledge about global climate systems.

The National Climate Change Process encourages analytic collaboration among federal, provincial and territorial governments, universities and the private sector to enhance Canada's capacity for scientific, technical and economic analysis. Internationally, Canada is already a significant contributor to climate system science participating in the international network of climate observation, and the overall analytic program of the Intergovernmental Panel on Climate Change. Each year, Canada and other participating countries make substantial contributions to the cumulative global understanding of the risks, impacts, challenges and opportunities associated with mitigating, or adapting to, the effects of climate change.

Similar to the First National Business Plan, the actions described under this theme reflect the efforts underway to improve data, broaden scientific observations, develop national and international climate information networks, and enhance scientific and economic models and methods. This work will help governments prepare for domestic decision-making under each Phase of the National Implementation Strategy and guide ongoing international negotiations through an improved understanding of the consequences of options for action as well as an enhanced scientific awareness of climate change risks and impacts.

Objectives and Supporting Actions

a) **To model and analyze the national, regional and sectoral economic, environmental, health and social costs/benefits of climate change actions.**

b) **To facilitate policy options development and assessment** to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time.

c) **To inform Canada's international climate change negotiations and reporting obligations and ensure domestic actions account for international developments.**

d) **To facilitate increased scientific understanding of climate change and its impacts** as the basis for developing appropriate mitigation and adaptation options.

The preceding objectives, and the expected results from actions approved and underway and those under consideration, are described more fully in the following sections:

a) To model and analyze the national, regional and sectoral economic, environmental, and social costs/benefits of climate change actions.

In 1998, at the direction of First Ministers, the National Air Issues Coordinating Committee - Climate Change (NAICC-CC) formed an

Analysis and Modelling Group (the **AMG**) to analyze the costs and benefits of meeting Canada's emissions reduction target under the Kyoto Protocol. The AMG has four broad areas of responsibility: i) to enhance the understanding of the economic implications for Canada of the Kyoto Protocol; ii) to assist other national working groups in modeling and analysis of policy options; iii) to develop recommendations to expand Canada's analytic capacity over the long term; and iv) to undertake integrated evaluations of the economic implications of various analytic cases.

The AMG has formed a partnership with Industry Canada and the Industry Steering Committee on Climate Change to undertake an in-depth inquiry into sectoral competitiveness under the Kyoto Protocol. The inquiry has two components: first, consultations with industry groups to better determine the relationship between emissions reduction policies and factors impacting competitiveness and their use in modelling work; and secondly, an assessment of the vulnerability of various Canadian industries in response to competitive pressures from developing (i.e. non-Annex B) countries.

The AMG has also contracted a consultant to develop a series of reports on the implications of climate change policy actions on economic development trends and official strategies for all the provinces and territories across Canada. These reports provide background information for jurisdictions on possible effects of climate change policies on their economies.

AMG is also undertaking a second round of analytical modelling to test possible policy approaches such as emissions trading, targeted measures and allocation of the target.

Results Anticipated

As a continuation or extension of work begun for the First National Business Plan, actions underway and under consideration will improve Canada's data and modelling capability with regard to climate change and will provide the basis for:

- Better advice, on a disaggregated and sectoral and jurisdictional basis, with respect to domestic policy and program options;
- Improved assessment of competitiveness, trade and investment implications of various policy options;
- Facilitated dialogue between federal and provincial governments on climate change planning;
- A better understanding of the role of technology in achieving climate change objectives; and

An enhanced ability to assess the environmental and health implications of actions taken to reduce GHG emissions.

Actions Approved and Underway

Objective: To model and analyze the national, regional and sectoral, economic, environmental, and social costs/benefits of climate change actions.

First Jobs in Science and Technology [Ref. 2002 - 059] — *Canada*

To provide financial assistance to small firms in western Canada for the hiring of recently graduated, unemployed or under-employed science and technology graduates for three-year terms. Over time, the Program will enhance the productivity and technological capability of small business in western Canada, in a variety of sectors, including environmental companies working on climate change technologies. In addition, it will result in a workforce of young scientists and technologists who possess the necessary entrepreneurial skills in a competitive environment.

In partnership with Western Canadian Small Businesses.

Biodiesel Study [Ref. 2002 - 064] — *Alberta*

To conduct a preliminary assessment of the supply, marketing, and environmental aspects of producing and using biodiesel in Alberta. This study will provide the basis on which a biodiesel plant may be established in Alberta and will provide a foundation for a biodiesel demonstration project and more widespread use of biodiesel in the province. (Alberta Transportation)

In partnership with Alberta Energy Research Institute, Alberta Innovation and Science and Alberta Agricultural Research Institute.

Atmospheric Environment Program [Ref. 2002 - 186] — *Canadian Space Agency (CSA)*

To provide the research community in Canada with opportunities to fly space-borne scientific instruments for scientific measurements and research, and to develop the required analysis and modelling tools to interpret the atmospheric data. CSA's Program results in greatly improved measurements of key elements of the Earth's atmosphere, leading to improved understanding of climate change with informed predictions and policy decisions.

In partnership with stakeholders from Universities, the private sector and government agencies.

Improved GHG inventories [Ref. 2002 - 069] — *British Columbia*

To obtain more complete GHG emission data from large permitted sources. The province is collecting and publishing data on emissions from large permitted sources. Companies submit data on a voluntary basis, every 5 years. (Ministry of Water, Land and Air Protection) **(2001/02 - $20K)**

In partnership with Georgia Basin Ecosystem Initiative and Environment Canada.

Earth Surface Environment Activities [Ref. 2002 - 187] — ***Canadian Space Agency (CSA)***

To develop and use space borne earth observation technologies to study the cryosphere; monitor the sustainable development of Canadian forest; understand the interaction between land-based ecosystems and climate change; map near-shore changes and study the evolution of coastal zones with their ecosystems; and monitor northern offshore marine environment and its interaction with global climate at northern latitudes. The information will provide a better scientific understanding of climate change.

Energy Balances Project [Ref. 2002 - 140] — ***Canada***

To maintain the enhanced level of data validation, integration and analysis required to produce coherent Energy Supply Demand Balances for Canada, that are central to greenhouse gas calculations and policy development in this area. This initiative provides the necessary resources to reduce sources of statistical error and thereby improve the quality of Energy Balance estimates. (Statistics Canada)

Wind Resources Study [Ref. 2002 - 105] — ***Manitoba Hydro***

Several measures are being undertaken leading to a potential wind turbine demonstration project. These activities include: hiring a consultant to provide information on current wind energy costs, wind resource assessment and site selection methodology.

Research and Development Projects [Ref. 2002 - 094] — ***Manitoba Hydro***

To support of Research and Development projects related to greenhouse gas and climate change issues.

Reservoir Emission Studies [Ref. 2002 - 095] — ***Manitoba Hydro***

To study greenhouse gas emissions from hydroelectric reservoirs. Manitoba Hydro has been working with the Freshwater Institute to determine emissions attributable to hydroelectric reservoirs. This research will be increased.

Heavy Trucking Greenhouse Gas Emissions Baseline [Ref. 2002 - 086] — ***Manitoba***

Research and develop modeling tool to improve the estimates of greenhouse gas emissions from the trucking industry fleet in Manitoba. (Manitoba Transportation and Government Services)

Saskatchewan Forest Centre [Ref. 2002 - 015] — ***Saskatchewan***

To recognize and develop the environmental benefits of sustainable development in Saskatchewan agroforestry. Establish agroforestry as a viable economic base that expands the forested land base in the province, thereby meeting industry needs and providing a potential carbon sink revenue source for Saskatchewan farmers. To bring together the best training, market research and private sector involvement and work with existing educational institutions, research groups and industry to focus on agroforestry, value added and forest science. (Sask Forest Centre)

In partnership with Provincial and Federal governments.

Western Diversification Program [Ref. 2002 - 061] ***Canada***

Western Economic Diversification's (WD) climate change philosophy is based on three principles. 1. Climate change can bring economic opportunities and is important to the long-term well being of all Canadians. 2. WD is helping stakeholders work on shared climate change priorities. 3. WD is using existing programs and new instruments to address the supply side of the climate change challenge. WD's ability to advance economic opportunities in climate change through delivery mechanisms is helping western firms become more informed and better prepared to develop, adapt and incorporate climate change technologies and practices and undertake climate change projects.

Improve Yukon GHG Inventory [Ref. 2002 - 024] ***Yukon***

To enhance and update the Yukon GHG Inventory. Government Services adopted requirements for design of new buildings to fully investigate energy options. (Department of Economic Development)

Commercial and Institutional Building Energy Use Survey (CIBEUS) [Ref. 2002 - 141] ***Canada***

To calculate the energy intensity of a building is a primary objective of the survey. In addition to energy intensity, other building characteristics are highlighted such as age, size, type of windows, insulation. The survey will also provide information on types of heating and cooling equipment, and lighting and energy efficiency measures. CIBEUS was conducted in geographic areas of 175,000 people and greater (50,000 in Atlantic Canada). The survey sampled 5,000 buildings using a personal interview of the building manager or owner. (Statistics Canada)

Actions Under Consideration

Objective: *To model and analyze the national, regional and sectoral, economic, environmental, and social costs/benefits of climate change actions.*

Biodiesel Demonstration Project [Ref. 2002 - 065] ***Alberta***

To test biodiesel fuel in a fleet application (transit authority, freight), providing the foundation for more widespread use of this alternative fuel in Alberta. Partner with a fleet operator and engage in a biodiesel demonstration project that would monitor the performance and environmental characteristics of this fuel through in-use applications. Following the test phase, a communications campaign would be activated to promote biodiesel to other fleet applications within the province, as a positive GHG mitigation measure. (Alberta Transportation)

Canadian Vehicle Survey - Fuel Use [Ref. 2002 - 142] ***Canada***

To measure fuel consumption by vehicles on Canadian roads. This could be achieved through a survey of vehicle owners (to be determined). (Statistics Canada)

b) **To facilitate policy options development** and assessment to position Canadian governments and stakeholders to make informed domestic and international decisions at the right time.

In fulfilling its mandate from ministers, the NAICC-CC has identified a need to develop a common understanding of various policy options to meet commitments under the Kyoto Protocol. This includes assessment of options such as allocation and burden sharing, domestic emissions trading, sinks enhancement and incentives. Discussion and analysis of the various policy approaches began under the First Business Plan and will continue to inform future decisions under the National Implementation Strategy, in particular decisions regarding the ratification of the Kyoto Protocol. To provide focused analysis and policy advice, several federal/provincial/territorial working groups have been struck under the NAICC-CC.

The **Domestic Emissions Trading Working Group** is pursuing a detailed work plan that involves a comprehensive review of prospective Domestic Emissions Trading (DET) options, with a focus on coverage and permit allocation options. The working group is also analyzing issues related to the linkage of domestic and international emissions trading systems, trade/competitiveness implications of DET, credit trading as a complement to a mandatory, allowance-based DET system, possible federal/provincial/territorial arrangements for the implementation and operation of a DET system, and transition to DET. The Group consults with industry and other stakeholders through workshops, meetings and teleconferences.

The **Electricity Covenants Group** is working towards the development of a sector agreement in the electricity generating sector. The objective is to work towards an agreement to reduce GHG emissions from the electricity sector starting with an emissions intensity reduction using covenants between generators, the provinces and federal government, as appropriate.

The **Emission Allocation and Burden Sharing Working Group** is conducting analytical work on the possible provincial/territorial or sectoral allocation of any Canadian target. To date, work has involved the examination of the European Union's Emissions Allocation System and its potential application in Canada and the examination of the meaning and measurement of burden, including several indicators of burden.

The **Impacts and Adaptation Working Group's** primary role is to develop a broad framework for adaptation that will inform and guide the development of jurisdictional-specific strategies, measures and actions with respect to adapting to a changing climate in a timely and cost effective manner.

The **Targeted Measures Coordination Group** is to define, for analytical purposes, possible packages of measures as a complement or alternative to DET and ensure that the assessment of the impacts of targeted measures is undertaken in a fashion that enables a valid comparison with DET. For example, targeted measures could assist in the transition to a DET system, cover sectors where emissions reductions through an emissions trading system would not be feasible, or be implemented as an alternative to DET (e.g. a package of measures such as regulations, information programs, financial incentives and taxes, that are targeted at the best opportunities to reduce emission reductions).

The **Climate Change Technology Working Group** is identifying promising climate change technologies, developing approaches to accelerating the development and demonstration of selected technologies towards market readiness, and raising awareness and understanding of the potential role of technology advancements to reduce emissions in the near-term and long-term.

NAICC-CC members also participated in a Climate Change in Environmental Assessment working group which is examining the development of a "practitioner's handbook" as a tool to assist in a project's implementation during the Canadian Environmental Assessment Act (CEAA) process by synthesizing current practices for examining, where relevant, the potential impact of climate change activity on a project in the long term and to mitigate to the extent possible the emissions of greenhouse gas emissions.

Another focus area for the NAICC-CC is the enhancement of forest and agricultural sinks. Begun under the First National Business Plan, analysis is still required to map sink potential and understand carbon stock changes related to forest and agricultural activities. This analysis will promote the development of systems to measure, verify and report changes to carbon stocks from reforestation, afforestation and deforestation and other activities in the managed forest, as well as corresponding changes in agricultural and forest soils.

The assessment of policy options will provide an improved basis for understanding and position governments and stakeholders to make informed decisions at the right time.

Results Anticipated

- Intensive consultations with stakeholders and the public;
- Analytical review of alternative broad strategies involving different domestic emission trading/allocation approaches combined with different sets of additional measures; and
- Federal, provincial and territorial discussion of the relative roles of the different jurisdictions, under alternative broad strategies, to achieving emissions reductions target.

Actions Approved and Underway

Objective: *To facilitate policy options development and assessment.*

Monitoring and Reporting Regulation (O.Reg 127/01) [Ref. 2002 - 243]

Ontario

To create an emissions inventory (including GHGs) that will: provide improved public accountability for all sources of air pollution in the province by posting emissions data on our Website; motivate companies to lower their emissions, since it is now the public's right to know who is releasing what; level the environmental playing field for companies in all sectors; help the ministry set and enforce new emissions limits and prepare for innovative new environmental initiatives; and be a valuable tool for tracking the progress of the ministry's many air quality initiatives.

In partnership with industrial, institutional, commercial and municipal emitters. (Ontario Ministry of the Environment)

Climate Science: Biological GHG Sinks Research Strategy [Ref. 2002 - 150]

Canada

To provide tools for the verifiable measurement of changes in the amount of carbon stored in Canadian forests and agricultural soils and provide information for management and policy development to enhance the carbon stored in the Canadian biosphere. To enhance the estimates of biological GHG sources and sinks. (Environment Canada)

In partnership with universities and provinces (through BIOCAP Canada and their partners).

The Role of Permits and Credits for GHG Free Energy [Ref. 2002 - 008]

Canadian Nuclear Association

To evaluate the allocation of emissions permits and/or emission reduction credits to non-emitting energy sources. The Domestic Emissions Trading Options Report introduces the concept of allocating emissions permits to non-emitting energy sources to encourage investment. The concept of establishing credits, domestically, for avoided emissions is also discussed briefly. However, as cap and trade between emitting entities has been the focus of discussion to date, this program will extend the study to trading schemes, which focus on alternatives.

Select Committee on Alternative Fuel Sources [Ref. 2002 - 244]

Ontario

To investigate, report, and recommend ways of supporting the development and application of environmentally friendly, sustainable alternatives to our existing fossil fuel sources. An all-party committee is studying and making recommendations on innovative alternatives. The committee is holding consultations with experts and its final report will be made public once the committee completes its work in May 2002. (Ontario Legislature)

Science and Policy Research for Health and Climate Change [Ref. 2002 - 194]

Canada

To develop interdisciplinary evidence, policies, and strategies to identify, and manage the risks to health and well being from climate change and climate variability. This initiative will build on the findings of the First Annual Health & Well-being and Climate Change National Science & Policy Research Consensus Conference held in March 2001. The work includes leading the health sector of C-CIARN.

In partnership with health professionals, researchers and research institutions across Canada, as well as provincial, territorial, and municipal public health officials, and non-governmental organizations.

Actions Under Consideration

Objective: *To facilitate policy options development and assessment.*

Climate Science: Climate Science Agenda for Canada [Ref. 2002 - 151]

Canada

To develop a Climate Science Agenda for Canada by identifying priority climate science challenges and setting up a process to optimally use available resources. (Environment Canada)

In partnership with provinces and territories.

c) To inform Canada's international climate change negotiations and reporting obligations and ensure domestic actions account for international developments.

Since the First National Business Plan was produced, the international community has been focused on the development of rules and frameworks for actions to reduce GHG emissions under the Kyoto Protocol. The international community was successful in getting a political agreement on how the Kyoto Protocol would be implemented at the Sixth Conference of the Parties (CoP6bis), held in Bonn in July 2001, and confirmed at CoP7, in Marrakesh in November 2001.

The agreement included a comprehensive approach to sinks. Canada must account for afforestation/reforestation (planting new forests where none has existed for some time) and deforestation (permanent loss of forest). Credits and debits resulting from these activities are not limited. As well, Canada can choose to account for forest management and agricultural land management. Forest management credits for Canada are limited to a maximum of 44 Mt of CO_2 per year in the commitment period, while there is no limit to credits from agriculture. The definitions and accounting provisions are favourable to our national circumstances.

A viable framework for implementing the Kyoto mechanisms, with acceptable access to credits, was also negotiated. There are no "cross links" within the agreement that would unreasonably limit access to the Kyoto Mechanisms. In the short-term a few issues remain to be resolved (e.g., the development of a compliance regime).

Of importance for Canada is the recognition of credits for the export of cleaner energy, mainly to the United States, that results in global emissions being lower than they otherwise would be. Canadian natural gas and electricity exports enable the US to forego the use of more emission intensive fuels, resulting in lower emissions globally. Presently, Canada must include emissions associated with these exports in its national inventory. Canada is pursuing the issue of recognition of credits for the export of cleaner energy at the international level.

In October 2001, Canada hosted a UN-endorsed, informal meeting in Calgary, Alberta to explore issues associated with "cleaner" energy trade and the objectives of the United Nations Framework Convention on Climate Change/ Kyoto Protocol. At CoP7, in Marrakech, Morocco, Canada was able to obtain support for a formal Convention workshop, to be held in Whistler, British Columbia in May 2002. Now referred to as the "Proposal on cleaner or less greenhouse gas-emitting energy", following the workshop, a report will be prepared for CoP8 where the issue will again be discussed.

However, climate change remains a long-term issue whereby policies will continue to evolve under the Convention as negotiations proceed. While they are currently focused on elaboration of the Kyoto Protocol, increasingly they are expected to address the global nature of climate change – both with respect to impacts and the need for adaptation, as well as the contribution of all countries and regions to the reduction of the emissions.

Canada will need to continue to invest in science and, in technical and economic analysis necessary to both develop and support its international negotiation positions and to contribute to broader international understanding of climate related issues. In addition, it is important to ensure that stakeholders' views are heard and taken into account in the development of Canada's national and international policy positions.

Results Anticipated

- Providing policy capacity to develop and advance Canada's negotiating positions;
- Enabling active, effective participation in the international processes;
- Informing the development of domestic strategies and decisions (e.g. DET and sinks);
- Ensuring a strong linkage between international positions and domestic strategy and action; and
- Informing and consulting with stakeholders with respect to federal negotiating positions.

d) To facilitate increased scientific understanding of climate change and its impacts as the basis for developing appropriate mitigation and adaptation options.

In its *Third Assessment Report (2001)*, the Intergovernmental Panel on Climate Change concluded that there is increasing evidence of human contribution to global climate change and identified some of the risks and benefits it poses. There remains important work to be done to refine our understanding of the climate system, climate changes and the vulnerability of Canadians to those changes.

Although climate change will have consequences all over the world, not all regions will be affected equally, nor are all regions equally vulnerable to those impacts. As a northern country, Canada is expected to experience faster warming due to climate change than countries further south. Moreover, while climate changes and impacts in Canada will mirror global ones, significant regional variations are anticipated due to the size of the country, its diverse landscape, and its ocean boundaries.

In fact, Canada is already experiencing the effects of a changing climate - melting permafrost under northern roads is dramatically increasing maintenance and infrastructure costs, warmer temperatures are causing a loss of volume in glaciers and ice fields in British Columbia, and a rise in sea levels on the Atlantic coast is also a concern.

Our vulnerability to climate change depends both on the nature of the impacts and our ability to adapt to them. The rate of climate change is a critical factor.

Efforts aimed at monitoring the state of climate, understanding the functioning of the climate system, and improving the ability to model and project future climate change, provide a sound scientific basis for decisions on reducing greenhouse gas emissions, adapting to climate changes, informing international negotiations, and engaging the public.

There is also a need for research to reduce the uncertainties associated with the consequences of the impacts of climate change and to take timely and progressive action to adapt. The field of climate impacts and adaptation is relatively new and covers a wide range of sectors and activities. Past investment in this field has identified broad sensitivities to climate change across Canada, but less attention was paid to understanding our capacity to adapt. Some activities under consideration in the First National Business Plan are now underway and will be enhanced by additional activities in this Business Plan.

The climate science component builds on measures introduced in the First National Business Plan with a focus in this Plan on two priority areas that are important in meeting Canada's international commitments: addressing deficiencies in Canada's climate monitoring networks, particularly in the North, and, enhancing understanding of the potential of forests and agricultural soils to store carbon through a research program on biological GHG sources and sinks. In addition, measures are included to develop a Canadian climate science agenda beginning with the process of identifying priority climate science challenges and setting up a process to make optimum use of available resources.

Policies to reduce greenhouse gases will not eliminate climate change but will affect the rate and extent to which climate changes and thus the relative degree of impact. Policies to promote adaptation will be essential to the long-term quality of life of all Canadians. Adaptation is not without cost, but taking steps to plan and implement proactive adaptation can reduce the cost and result in opportunities for innovation.

Objectives and Supporting Actions

d-i) To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections.

d-ii) Improve the organization of the research community.

d-iii) Increase research focused on climate change impacts and adaptation.

d-iv) Periodically assess state of knowledge of impacts and adaptation in advance of major decisions.

The work to address gaps in Canada's systematic climate monitoring networks is focused in three areas: atmosphere, oceans and cryosphere (snow, ice and glaciers). The goal of this work is to document and understand variability in the climate of Canada for the development and validation of climate models and as a baseline for adaptation and to improve projections of the rate and magnitude of climate change in Canada.

To better understand biological GHG sources and sinks, work will focus on providing: tools for the verifiable measurement of carbon-stock changes in Canadian forests and agricultural soils; and, information for management and policy development to enhance the carbon-stock in the Canadian biosphere. In this regard, the BIOCAP Canada Foundation is working with the university research community to improve the understanding of how agriculture can help meet the challenge of climate change.

A major focus of adaptation work among jurisdictions has been and will continue to be the Climate Change Impacts and Adaptation Research Network (C-CIARN). Regional and sectoral nodes have been established and will be developing information on vulnerabilities, research gaps, priorities and capacity needs within provinces and territories and across jurisdictions through sectoral nodes. For instance, British Columbia is working with partners to establish C-CIARN BC as a focal point for research into climate change impacts and adaptation in the province.

Adaptation is being integrated into planning processes; for example, Nova Scotia is developing a framework for incorporating adaptation into land use planning while the Manitoba Crop Insurance Corporation is reviewing crop insurance strategies in relation to the challenges and opportunities presented by climate change.

Results Anticipated

- Improved knowledge of past, present and future states of climate as input to impacts and adaptation studies;
- Enhanced estimates of biological GHG sources and sinks in order that Canada can better utilize them in meeting emissions reduction targets;
- More complete understanding of the longer term sectoral, regional and national impacts of climate change; and
- Help develop jurisdictional adaptation priorities and strategies.

Actions Approved and Underway

Objective: *To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections.*

National Research Network on Agriculture Greenhouse Gas (GHG) Management [Ref. 2002 - 128]

BIOCAP Canada Foundation

To understand sources and sinks of greenhouse gases in agriculture, develop and test tools for quantifying emissions and soil carbon sinks, develop and engineer technologies to reduce agricultural emissions or enhance soil carbon sinks, and to assess environmental impacts as well as economic and social effects of strategies or technologies for managing greenhouse gases. BIOCAP is working to ensure the university research community contributes to national efforts to understand how changing the way agriculture can become part of the solution to the challenges of climate change while creating other benefits such as new markets for products, a revitalized rural economy, and cleaner water and air.

(2001-2004 Approx. $1.0M)

In partnership with the Government of Canada, Governments of Alberta, Ontario & Saskatchewan, Suncor, Shell, TransAlta, Ontario Power Generation, TransCanada, Dofasco, Dupont, Al-Pac, Pollution Probe and Queen's University.

Science, Impacts and Adaptation - Indicators of Climate Change for BC [Ref. 2002 - 071]

British Columbia

To report on a preliminary set of climate change indicators for BC. The climate, physical and biological indicators were examined and published in a report which is on the ministry website, along with supporting technical documents. (Ministry of Water, Land and Air Protection)

Climate Science: monitoring [Ref. 2002 - 149]

Canada

To address the deficiencies in Canada's climate monitoring networks, particularly in the North, to document and understand variability in the climate for the development and validation of models and to improve projections of the rate and magnitude of climate variations. To enhance Canada's monitoring networks through three sub-initiatives that will augment our current observations of the climate in the atmosphere, the oceans and the cryosphere (mostly snow and ice). (Environment Canada)

In partnership with provinces and territories.

Earth Atmosphere Energy and Trace Gas Exchange [Ref. 2002 - 176]

Canada

To investigate the exchange of energy and trace gases between the Earth's surface and the atmospheric boundary layer to develop improved coupled atmospheric/biospheric models for long-range weather prediction and for Global Climate Change studies. (National Research Council)

Development of high-resolution records of climate change in southern Manitoba for the last 1,000 years. [Ref. 2002 - 121]

Manitoba

To develop high-resolution records of climate change in southern Manitoba that span the last 1,000 years. The information stored in natural archives such as tree rings and lake sediments can extend our current instrumental records of temperature, precipitation and stream flow 10,000 years into the past. (Manitoba Industry, Trade and Mines)

In partnership with Natural Resources Canada.

Incorporating Climate Change into Land Use Planning [Ref. 2002 - 202]

Nova Scotia

To learn how climate change adaptation could be integrated into land use planning. To review anticipated impacts in NS and municipal planning process, develop a framework for including climate change in the planning process, and pilot the use of framework in one planning area. (Department of Environment and Labour) **(2002-03 $190K)**

In partnership with Halifax Regional Municipality and Private Consultants.

Inuit Qaujimajangit (Inuit knowledge) on Climate Change in Nunavut [Ref. 2002 - 212]

Nunavut

To document Nunavummiut observations and experiences of climate change impacts and adaptations. The observations within the communities are recorded during semi-directed interviews, workshops and radio phone-in programs. The project is phased to include all of Nunavut over a 2-year period.

Prairie Adaptation Research Collaborative (PARC) [Ref. 2002 - 324]

PARC

To facilitate interdisciplinary research, understand potential impacts of climate change on the Canadian Prairie Provinces, and conduct research necessary to develop appropriate adaptation strategies.

PARC is a partnership between the Government of Canada, Alberta Environment, Manitoba Conservation, Saskatchewan Research Council, and University of Regina.

Impacts of CC on Island Ecosystems in Southern Saskatchewan [Ref. 2002 - 326]

Saskatchewan

To develop management strategies for ecosystems vulnerable to climate change. Ecosystems being examined include the Cypress Hills in Alberta and Saskatchewan; Spruce Woods in Manitoba; Moose Mountain in Saskatchewan; Sweet Grass Hills in Montana; and Turtle Mountain in North Dakota.

Saskatchewan Environment in partnership with Prairie Adaptation Research Collaborative.

International Guidelines for Assessments of Health Impacts and Adaptation from Climate Change and Climate Variability [Ref. 2002 - 195]

Canada

To facilitate and coordinate a science and policy research agenda and extramural funding for health and climate change. Health Canada and other partners are developing guidelines for use by national Ministries of Health who need to assess health and social impacts of climate change and climate variability. Assessments will inform development of public health and health service infrastructure adaptation measures needed to cope with the anticipated impacts. (Health Canada)

In partnership with international health partners.

Objective: *To improve the organization of the research community.*

National Research Network on the Forest Carbon Cycle [Ref. 2002 - 131]

BIOCAP Canada Foundation

To ensure that the university research community contributes optimally to national efforts to understand how climate change, human activity and natural disturbance affect the carbon cycle of forests and changes in its carbon pools. These insights will contribute to our understanding of the role of the Canadian biosphere in modulating atmospheric CO_2, and in the measurement, monitoring, modeling and international reporting of forest carbon stock changes.

(2001-2004 Approx. $1.0M)

In partnership with the Government of Canada, Governments of Alberta, Ontario & Saskatchewan, Suncor, Shell, TransAlta, Ontario Power Generation, TransCanada, Dofasco, Dupont, Al-Pac, Pollution Probe and Queen's University.

National Research Network on Bio-based Products [Ref. 2002 - 129]

BIOCAP Canada Foundation

To identify the economic and technological 'bottlenecks' in the large-scale conversion of biomass into energy, chemical and materials (i.e. bio-based products); to develop and optimize (bio) engineering technologies for the conversion of biomass into bioproducts; to select or engineer crops, trees, microbes or biocatalysts for the optimal production of bio-based energy chemicals or materials; explore social, environmental and economic implications.

(2001-2004 Approx. $1.0M)

In partnership with the Governments of Canada, Alberta, Ontario & Saskatchewan, Suncor, Shell, TransAlta, Ontario Power Generation, TransCanada, Dofasco, Dupont, Al-Pac, Pollution Probe and Queen's University.

BC Climate Change Impacts Adaptation [Ref. 2002 - 070] Research Network (CCIARN-BC)

British Columbia

To establish a BC Climate Change Impacts Adaptation Research Network (CCIARN-BC), in order to encourage and coordinate priority research into climate change impacts and adaptation. (Ministry of Water, Land and Air Protection)

In partnership with the Sustainable Development Research Institute, UBC; Canadian Institute for Climate Studies, U of Victoria; NRCan, Adaptation and Impacts Research Group (EC), BC Ministry of Water, Land and Air Protection and CCAF (Action Plan 2000).

Research Capacity Building [Ref. 2002 - 144]

Canada

To build the capacity of the research community to address impacts and adaptation needs. Following an examination of the capacity gaps, funding will be partnered to increase the number of researchers working in climate change impacts and adaptation research fields. (Natural Resources Canada) **($2M over 5 years)**

Climate Change Impacts and Adaptation Research Network (C-CIARN) [Ref. 2002 - 145]

Canada

To enhance the coordination and collaboration between impacts and adaptation researchers and stakeholders by providing a focal point for contacts, data and information relating to this research across Canada. The network will deliver reports on research gaps, priorities and capacity needs, and will hold workshops and other events to facilitate the exchange of the latest research results and techniques, identify gaps and priorities and raise awareness of this aspect of the issue. The Network has 6 regions (BC, Prairies, Ontario, Quebec, Atlantic and North) and 7 sectors (Water Resources, Health, Forests, Agriculture, Fisheries, Coastal Zone, and Landscape Hazards. (Natural Resources Canada) **($10M over 5 years)**

In partnership with provincial and territorial governments, U of British Columbia, U of Regina, Laurentian U., McGill U., Dalhousie U., Yukon College and Aurora College.

Assessments of Impacts & Adaptation [Ref. 2002 - 143]

Canada

To improve understanding of the risks and opportunities presented by climate change in Canada, a national assessment will be undertaken involving researchers and stakeholders across the country. The assessment process will start in 2002 with the final documents published in 2005. (Natural Resources Canada)

In partnership with provincial & territorial departments and agencies, universities, aboriginal groups, communities, private sector and non-governmental organizations.

Nova Scotia Climate Change Adaptation Initiative [Ref. 2002 - 201]

Nova Scotia Environmental Industry Association

To develop a framework for integrating climate change adaptation into the environmental assessment process. The ultimate goal is to provide N. S. environmental consulting companies with new skills, experience and marketing support needed to successfully compete for consulting contracts at the regional, national and international level. This model will be tested and refined through actual projects. Marketing this project, the knowledge obtained as a result of it, and the services of the firms that participate will be a key component of the overall project. **(2002-03 $190K)**

In partnership with The Nova Scotia Environmental Industry Association, the Halifax Regional Municipality, the Nova Scotia Department of Environment and Labour and a consortium of local consulting firms.

Climate Change Impacts and Adaptation Research Network - C-CIARN North [Ref. 2002 - 036]

Yukon

To build a network of researchers and stakeholders that will support the development of credible information on the vulnerabilities of northern Canada to climate change, and the identification of the the most significant impacts and adaptation options, in order to help anticipate and prepare for changes that are expected during the 21st Century. The initiative is part of a national network of centres for coordinating climate change impacts and adaptation research and for disseminating information and research results. (Yukon Energy, Mines and Resources and Yukon Environment)

($100K 2001-02, $150K for 2002-03, $150K for 2003-04)

In partnership with the Government of Canada, Northern Climate ExChange, Yukon College, Aurora Research Institute and Nunavut Research Institute.

Communication Strategy for Research into Canada's Green Advantage [Ref. 2002 - 130]

BIOCAP Canada Foundation

The communications role of BIOCAP is two fold. First, internal communications are intended to support co-ordination, collaboration and scientific understanding among researchers, members, partners and policy-makers within the BIOCAP community. Second, external communications bring new research results and their policy implications to the attention of the public, the broader scientific community, stakeholders and decision-makers. **($200K /yr)**

In partnership with Government of Canada, Governments of Alberta, Ontario & Saskatchewan, Suncor, Shell, TransAlta, Ontario Power Generation, TransCanada Pipeline, Dofasco, Dupont, Al-Pac, Pollution Probe and Queen's University.

Inventory of Climate Change and Health Scientific Researchers and Policy Analysts [Ref. 2002 - 190]

Canada

To develop and coordinate partnerships and public engagement on health and climate change issues. To establish a local to international directory of governmental and non-governmental researchers and policy analysts by health & well being issue to facilitate matching of researchers and analysts with funding opportunities. This initiative will include coordinating the development of project funding proposals with agencies funding research on health and climate change and with local to international researchers and appropriate stakeholders. (Health Canada)

In partnership with universities, provincial/territorial and municipal public health authorities, non-governmental organizations and research funding agencies.

International Cooperation on Global Climate Change and Health and Social Policy and Planning [Ref. 2002 - 193]

Canada

To facilitate and coordinate a collaborative policy and planning agenda to engage health and social policies and programs across Canada to manage risks to health from climate change and assist the World Health Organization in convening international Meetings of Ministries of Health on Climate Change to facilitate the global integration of national climate change and health policies by promoting international awareness of population health vulnerabilities and impacts from climate change and climate variability. (Health Canada)

In partnership with International and National Ministries of Health, the World Health Organization, Pan-American Health Organization, United Nations Environment Program, World Meteorological Organization and other international non-governmental organizations.

Collaborative Action to Address the Impacts of Climate Change on Human Health [Ref. 2002 - 192] — *Canada*

To create and support Climate Change and Health Policy Networks across Canada to promote and assist in the development of action plans to reduce the population health and social impacts of climate change associated with air pollution, water and food-borne contamination, temperature related morbidity and mortality, stratospheric ozone depletion, vector-borne diseases. (Health Canada)

In partnership with provincial, territorial and municipal government public health officials, non-governmental organizations and researchers.

Objective: *To increase research focused on climate change impacts and adaptation.*

Geoscience research in climate change impacts & adaptation [Ref. 2002 - 148] — *Canada*

To contribute to sustainable decision-making using the latest geosciences knowledge. Scientists will work with stakeholders to examine climate change impacts and potential adaptation responses related to permafrost degradation and infrastructure, flood and landslide hazards, water resources, and coastal erosion.

In partnership with provincial/territorial governments, private sector and municipalities

Funding Partner in Sustainable Forest Management (SFM) Network [Ref. 2002 - 103] — *Manitoba*

To support multidisciplinary forest research looking to find better ways to manage the boreal forest. The Sustainable Forest Management Network is one of 15 Networks of Centers of Excellence and is a unique university-based organization that supports multidisciplinary research to find better ways of managing the boreal forest. The SFM network is currently supporting four projects focused on carbon dynamics and/or climate change in the boreal forest. (Manitoba Conservation) **($20K/yr)**

In partnership with Canada's National Science and Engineering Research Council, Canada's Social Sciences and the Humanities Research Council.

Modeling Impacts of Climate Change on Prairie Ecosystems [Ref. 2002 - 325] — *Saskatchewan*

To improve understanding of impacts of climate change on Prairie Ecosystems. The project includes the extension of modeling habitat impacts of climate change on Prairie ecosystems to include all of southern Saskatchewan. This work uses a computer model built and tested on a more limited spatial scale.

Saskatchewan Environment in partnership with the Canadian Plains Research Centre and Prairie Adaptation Research Collaborative.

Objective: *To periodically assess the state of knowledge of impacts and adaptation in advance of major decisions.*

Enhanced Impacts and Adaptation Research Program *Canada*
[Ref. 2002 - 147]

To improve knowledge of Canada's vulnerabilities to climate change and provide information for decision-making in areas where impacts are already being felt and decisions taken now will have long-term implications. A national research program to address key gaps in our knowledge of Canada's vulnerability. Projects are cost shared and involve stakeholders to ensure decision-relevant research. Research topics include: communities, costing, food supply, forestry, health, industry, transport, water resources etc. (Natural Resources Canada) ($20M over 5 years)

In partnership with provincial & territorial departments and agencies, universities, aboriginal groups, communities, private sector and non-governmental organizations.

Actions Under Consideration

Objective: *To provide essential information on what is happening to the climate, how it operates and how it can be modelled to make useful projections.*

Inclusion of Adaptation in the Management Framework *Canada*
[Ref. 2002 - 146]

To establish mechanisms to examine the development of adaptation strategies. (Natural Resources Canada)

In partnership with provincial/territorial governments.

Objective To improve the organization of the research community.

Manitoba Impacts and Adaptation Research Network *Manitoba*
[Ref. 2002 - 092]

To establish a Manitoba coordinator for the Prairie Adaptation Research Collaborative (PARC) to assist researchers and key decision makers compose a strategic plan for adaptation research and to integrate Manitoba activities into regional and national work through PARC. (Manitoba Conservation)

In partnership with Prairie Adaptation Research Collaborative and Natural Resources Canada.

SECTION VII

Encouraging Action to Reduce Emissions

A) Sectoral Actions

The following seven sectors represent the key sectors of the Canadian economy in terms of GHG emissions. These sectors have so far made significant progress in reducing energy intensity and increasing energy efficiency and productivity, and in exploring new opportunities to reduce GHG emissions while delivering significant environmental benefits.

The actions recently introduced continue to lay the groundwork for long-term behavioural, technological and economic changes required to achieve Canada's international commitments to emission reductions.

a) Agriculture

Canada's agricultural sector is comprised of approximately 280,000 farm businesses, 98 percent of which are family owned. Greenhouse gas emissions from primary agriculture activities (not including transportation, input costs or agri-food processing) represent about ten percent of Canada's total emissions. Agriculture emissions are almost completely from non-energy sources. The main emissions in primary agriculture are nitrous oxide from fertilizers and manure, and methane from livestock and account for 96 percent of emissions, with the balance comprised of mainly carbon dioxide. Between 1990 and 2010, direct emissions in the agriculture sector are projected to rise by nearly 30% from 61 to 72 megatonnes. Emissions from farm vehicles, including tractors, are reflected in the transportation sector and those related to value-added processing are included in the industrial sector.

Like other sectors, agriculture could be seriously affected by changes in temperature, precipitation, diseases and overall crop yields. Climate change presents adaptation challenges that are expected to become more apparent over time for Canadian agriculture. The sector may, for example, have to cope with increased weather variability and higher risks of drought, flooding, and new insect infestations. Opportunities may also arise from climate change, notably a northward extension of crop lands and grazing zones. The adaptation costs of climate change are, nevertheless, a significant consideration.

Possible actions in this sector include a range of initiatives from basic scientific research to technology innovation and transfer, to adopting best management practices. Both crop and livestock production are covered. Through best management practices, farmers can reduce emissions of methane and nitrous oxide, and increase carbon sequestration in soils and shelterbelts.

Agricultural soils have significant potential to address climate change, acting as a sink for storing atmospheric carbon. As a result of the agreements on computing emissions reached at the Sixth Conference of the Parties (CoP6bis) held in Bonn in July 2001 and confirmed at CoP7 in Marrakesh in November 2001, sinks potential from current practices is now estimated at 10 Mt. Emission sources/sinks differ on a regional basis due to variations in agricultural practices and emphasis on livestock or crop production.

Some important climate change issues related to agriculture include the identification of the sources of GHGs from agriculture, the implementation of GHG-reducing agricultural practices, soil sinks, and the production of ethanol from cellulose. Many of the actions to reduce emissions in the agriculture sector are also good environmental and economic practices; they are already being promoted for ancillary benefits such as soil and water quality and lower input costs. Based on the current level of understanding of agricultural GHG emissions, there are practices that can be promoted now to reduce emissions, but considerable research is needed on the interaction of the three gases and to support the development of new technologies and practices. Promising areas are fertilizer management, livestock systems (feeding, grazing, manure) and soil management (including increasing soil organic carbon).

The limited financial capacity of many farmers is one of the key challenges to the adoption of new management practices and investments in new technologies.

Objectives and Supporting Actions

a) **To advance the development and demonstration of new and emerging agricultural technologies** to reduce and monitor GHG emissions.

b) **To increase scientific research capacity and coordination** to position the agriculture sector to respond to climate change. Advance research on emissions, adaptation, and sinks, and improve modelling and analysis capabilities to support the development of policies.

c) **To identify best practices that support climate change mitigation and adaptation**, and other economic and environmental objectives.

d) **To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink.**

Among the recently introduced initiatives, provinces, such as Manitoba, are seeking to enhance soil quality and reduced emissions from stubble burning through improved crop residue management and to improved management decision-making using real-time weather information.

Many provinces are also encouraging alternative farming practices to reduce emissions through education initiatives, research and demonstrations, optimizing irrigation and improving fertilizer practices. Incentives and landowner recognition are being considered for actions taken to protect riparian areas and improve water quality. Also under consideration are strategies to increase awareness and opportunities for sequestration of greenhouse gases.

Results Anticipated

- Better understanding of GHG emissions, as well as the potential contribution of agricultural soils as a carbon sink;
- Improvement of the scientific knowledge for the development, demonstration and transfer of new, effective technologies and best management practices that provide important ancillary benefits (notably improved air and water quality);
- Increased awareness and understanding and promotion of new technologies and practices;
- Increased capacity to conduct economic and policy analysis, leading to the design of better programs and instruments.

Actions Approved and Underway

Objective: *To advance the development and demonstration of new and emerging agricultural technologies.*

Crop Residue Management Program [Ref. 2002 - 115] — *Manitoba*

To improve crop residue management to enhance soil quality and reduce atmospheric emissions from stubble burning. This program includes legislation aimed at reducing the practice of stubble burning and nuisance smoke. Daily weather and environmental conditions are utilized to provide authorization for controlled residue management. Awareness activities, new technology and actions on alternative use for crop residue support this program. Crop residue management influences the carbon sequestered or released from soil. (Manitoba, Agriculture and Food)

Removal and Reduction of Agricultural Greenhouse Gases [Ref. 2002 - 262] — *Alberta*

To develop a work plan for the inventorying, measurement, and verification of the net emissions effects resulting from the changes in land management practices, as well as to develop an agricultural based emission reduction trading protocol to facilitate success.

In partnership with Climate Change Central, Alberta Environment, Western Economic Diversification, AB Environmentally Sustainable Agriculture, AB Ag. Food and Rural Dev., Ag. and Agri-Food Canada, Ducks Unlimited, EPCOR, Shell, U of Alberta and TransCanada Pipeline.

Objective: *To increase scientific research capacity and coordination.*

2001 Farm Environmental Management [Ref. 2002 - 137] — *Canada*

To gather information on farm management practices via a survey conducted by Statistics Canada and Agriculture and Agri-Food Canada. To conduct a Survey of 20,000 farms stratified by river basin to obtain information on tillage methods, handling and storage of manure, pesticides and fertilizers, and to probe into the use of land and water management practices, as well as the extent of whole farm environmental management.

Agricultural Research Related to Climate Change [Ref. 2002 - 106] — *Manitoba*

To provide a grant to support research at the University of Manitoba. The Agriculture and Research Development Initiative is also available to encourage innovation in research. Manitoba Agriculture and Food has a number of new research projects in the province addressing the various aspects of climate change as it relates to agriculture.

Climate Change Technologies [Ref. 2002 - 312]

Climate Change Technology Working Group

To raise awareness and understanding of the potential role of technology advancements that would lead to emissions reductions in the near-term and the long-term. The Climate Change Technology Working Group, which was created in March 2001, is identifying promising climate change technologies and developing approaches to accelerate the development and demonstration of selected technologies towards market readiness.

A federal, provincial and territorial collaboration. **(2001–03 - $172k)**

Objective: *To identify best practices that support climate change mitigation and adaptation.*

Covering New Ground [Ref. 2002 - 224]

Manitoba

To improve environmental performance of agricultural ecosystem supporting our agriculture industry and to address economic viability and measurable solutions to environmental and social challenges. This program disseminates information on sustainable environmental management with a component that relates to climate change impacts and their mitigation or adaptation by agricultural producers and commodity organizations. (Manitoba, Agriculture and Food)

In partnership with more than 70 local delivery groups including commodity organizations and producer groups.

Climate Change Adaptation Public Information and Outreach [Ref. 2002 - 112]

Manitoba

Providing adaptation related information briefings, and workshops including awareness presentations at agricultural technical meetings throughout the province. (Manitoba, Agriculture and Food)

Manitoba Livestock Manure Management Initiative [Ref. 2002 - 091]

Manitoba

Initiative addresses best management practices and will accept projects that address climate change. (Manitoba, Agriculture and Food)

Canada Manitoba Agreement on Agricultural Sustainability [Ref. 2002 - 109]

Manitoba

To encourage alternative farming practices that enhance soil quality and reduce emissions from agricultural practices. The program directs approximately $20 million of equally shared funding toward practices such as reduced tillage, enhanced forage production and alternate residue management. These practices enhance soil quality and reduce atmospheric emissions from reductions in the use of fossil fuels as well as soil degradation. (Manitoba, Agriculture and Food)

In partnership with the Government of Canada.

Climate Leadership in Manitoba Agriculture [Ref. 2002 - 111] — *Manitoba*

To build upon the knowledge of climate change and create awareness in the agricultural sector. The Climate Leadership in Manitoba Agriculture (CLIMA) is a departmental committee which includes expertise in soils, conservation, livestock, agrometeorology, policy, and crop insurance. The committee has provided input to Manitoba Climate Change Task Force and is developing an action plan for agriculture. (Manitoba, Agriculture and Food)

Destination 2010 [Ref. 2002 - 116] — *Manitoba*

Outlines direction for Manitoba Agriculture and Food's strategic plan of action for the next decade that was developed with agriculture sector partners. The Plan states; "Assist the agricultural community in adapting to climate change. Foster the adoption of proven and new technologies and crops in addressing climate change".

In partnership with Agricultural Producers.

Taking Charge Program [Ref. 2002 - 327] — *Saskatchewan Soil Conservation Association*

To enhance awareness, knowledge and commitment among Saskatchewan producers to identify and utilize best management practices on their farms. This will assist in the mitigation of greenhouse gases in the agricultural sector and encourage sustainable soil conservation practices.

In partnership with Soil Conservation Council of Canada.

Best Management Practices for Yukon Crops [Ref. 2002 - 019] — *Yukon*

To support a multi-year research project to optimize irrigation and nutrient inputs to crops. Better irrigation and nutrient input reduce nitrous oxide and carbon dioxide emissions. The demonstration component of the project will inform producers in the use of irrigation and fertilizer practices that allow for maximum productive capability of Yukon's agricultural soil resources, without degradation. (Yukon Energy, Mines and Resources)
(2002/03 - $81K ; 2003/04 - $76K)

In partnership with the Yukon Agricultural Association, Agriculture Canada, Pacific Agri-Food Research Center.

Agro meteorological Centre of Excellence and Weather Station Network [Ref. 2002 - 107] — *Manitoba*

To provide detailed real-time weather information to producers across the province. This information is used by producers to make better-informed management decisions relating to disease, insect, irrigation and frost prediction. This information is expected to provide assistance to producers in adaptation to climate change. (Manitoba, Agriculture and Food)

Review of Crop Insurance Strategies [Ref. 2002 - 089] — *Manitoba Crop Insurance Corporation*

To review crop insurance strategies that addresses the challenge and opportunity of climate change. For example, the Manitoba Crop Insurance Corporation is considering options for managing risk as adaptation occurs to climate change.

Objective: *To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink.*

Ecologically Sensitive Land Tax Credit [Ref. 2002 - 118] ***Manitoba***

To provide incentive and recognition to landowners taking action to protect riparian areas and improve water quality. As an adaptation measure the improved riparian integrity would reduce the amplitude of the flood-drought cycle; marginally reduced GHG emissions are expected due to improve riparian integrity-cover and less disturbance to land. Offset to property taxes paid, calculated in dollars per acre affected, for specified riparian management measures on private agricultural land. (Manitoba Finance)

Actions Under Consideration

Objective: *To advance the development and demonstration of new and emerging agricultural technologies.*

Awareness and Research Programs [Ref. 2002 - 274] ***Newfoundland and Labrador***

To develop a series of programs to enhance awareness about climate change impacts and adaptation strategies for the agriculture sector and to raise awareness about the benefits of increasing the content of organic matter in soil (carbon sinks). The research programs being considered include: crop and livestock genetics, integrated pest management, best management practices, market research for green products and modelling.

Objective: *To identify best practices that support climate change mitigation and adaptation.*

Taking Charge Project [Ref. 2002 - 104] ***Manitoba***

To partner with the Taking Charge project which provides awareness on the issue of climate change. (Manitoba, Agriculture and Food)

In partnership with Manitoba Chapter of Soil Conservation Canada, Manitoba Zero Till Association.

Objective: *To position producers to seize the opportunities from the potential inclusion of agricultural soils as a sink.*

Sequestration-Emission Trading Opportunities Strategy [Ref. 2002 - 102] ***Manitoba***

To develop a Manitoba strategy for sequestration and emissions trading in partnership with the agricultural sector by raising awareness and knowledge, examining and developing options and policy for on-farm and agri-industry opportunities in future trading scenarios. The strategy also explores opportunities for agri- and bio-based products to mitigate and sequester greenhouse gases. (Manitoba, Agriculture and Food)

b) Buildings

Buildings account for just over 10 percent of Canada's GHG emissions. Opportunities in this sector range from improving energy intensity levels to new design and construction practices, to retrofitting existing buildings. Considerable efforts to address these opportunities in both commercial and residential buildings continue to be undertaken by all levels of government.

As the present building stock represents the majority of buildings that will exist in 2008-2012, the most effective way to improve the energy performance of these buildings in order to reduce GHG emissions is to undertake energy retrofits when renovating. As for new buildings, the most cost-effective, energy efficient way is at the design stage.

Objectives and Supporting Actions

a) **To promote good consumer choices through education and awareness and utilize existing expertise** in areas of construction, design and maintenance of the existing building stock.

b) **To improve best practices in the development of equipment for existing and new building stock.**

c) **To improve energy efficiency for existing and new building stock.**

A Built Environment Working Group, under the NAICC-CC, was formed in December 2001. The working group's mandate is to identify actions in the buildings sector requiring collaboration between federal, provincial and territorial governments. The working group identified nine possible actions contributing to Canada's commitment to reducing GHG emissions.

The Working Group is encouraging jurisdictions to act on activities such as, reviewing building codes, extending the EnerGuide for House Program, or providing reduced mortgage rates based on the energy efficiency level of new buildings.

The Commercial-Institutional Building Retrofit Initiative (CIBR) recently introduced by the Federal government encourages owners and operators of existing facilities to reduce costs and energy use through investments in energy efficiency. Improving the energy performance of new buildings can be accomplished by implementing an Integrated Design Process (IDP). An IDP is a collaborative process which encourages design team professionals to come together at the design stage of a project in order to realize high performance buildings.

Provincial initiatives range from testing a passive solar technology (Solarwall) in Nunavut, to woodstove replacement projects in Yukon and Nova Scotia, to public information campaigns for residential buildings in Ontario and Manitoba. Some utilities are facilitating the access to financing, at prime rate, for the acquisition (replacement) of natural gas furnaces and appliances.

Results Anticipated

- Increased consumer awareness vis-à-vis alternate choices when investment decisions are being made;
- Enhancement of best practices in developing more efficient equipment;
- Reduction of the overall energy-use in building sector.

Actions Approved and Underway

Objective: *To promote good consumer choices through education and awareness and utilize existing expertise.*

Energy Training and Certification [Ref. 2002- 290]

Yukon

To increase the use of energy efficiency and renewable energy technologies by improving the private sector's capacity to effectively implement integrated energy solutions. Training, in many cases equivalent to a national certification level, is offered to help promote and transform the local energy market towards energy efficiency and renewable energy solutions. (Yukon Development Corporation)

In partnership with the Canada-Yukon Energy Solutions Centre.

New Home and Home Energy Savers Workshops [Ref. 2002 - 223]

Manitoba

To assist people in making their homes more energy efficient and to choose more energy efficient new homes with public presentations provided at various urban and rural centres. The New Home Workshops provide information on how to plan an energy efficient home and describe R-2000 homes. The Home Energy Savers Workshops provide information on how to upgrade existing homes or to make energy efficient choices on new ones.

The Manitoba R-2000 Home Program [Ref. 2002 - 219]

Manitoba

The R-2000 Program recognizes the concept of the house functioning as a system, combining air tightness, insulation and solar orientation in order to maintain a high domestic building standard. The day-to-day administration is provided by Manitoba Conservation.

In partnership with the Government of Canada, Manitoba Hydro and Centra Gas.

Yukon Energy Efficient Appliances for Homes (YEEAH!) [Ref. 2002 - 294]

Yukon

To increase the understanding of the link between appliance use and climate change, and shift the local market towards energy efficient residential appliances. It consists of four components: promoting the economic and environmental benefits of energy efficient appliances; training local appliance retailers and service personnel about energy efficient appliances and associated ratings, and providing incentives to promote these models; targeting the replacement of old, inefficient fridges through small incentives; and, incorporating an appliance section in the EnerGuide for Houses audits. (Yukon Development Corporation)

In partnership with the Canada-Yukon Energy Solutions Centre and Yukon Housing Corporation.

Energycheck [Ref. 2002 - 016]

SaskPower

To offer a self-serve energy audit on the Internet to reduce personal energy use and costs in the home.

In partnership with SaskEnergy and Greenprint.

Housing Research Project [Ref. 2002 - 323]

Saskatchewan

To test if significant greenhouse gas emissions reduction is achievable in Canadian housing. The SRC project will work on six homes in Saskatoon this year with the target of reducing each home's natural gas and electrical consumption.

The Saskatchewan Research Council (SRC) in partnership with Canada Mortgage and Housing Corporation (CMHC)

Sustainable Buildings Symposium [Ref. 2002 - 265]

Alberta

The 4th annual symposium was held in May 2001 and focused on the fact that sustainable buildings make economic and environmental sense. The purpose of this symposium was to raise the level of awareness of sustainable or high performance building design in Alberta and to develop market demand and expertise to deliver this product.

In partnership with Climate Change Central, Manasc Isaac Architects, EPCOR, Keen Engineering, Alberta Infrastructure, SMED International, and Natural Resources Canada.

Objective: *To improve best practices in the development of equipment for existing and new building stock.*

Neighbourhood Woodstove Changeout and Atlantic Wood Energy Technicians Association/Education Pilot Projects [Ref. 2002 - 200]

Annapolis Valley Homebuilders Association

To educate residential woodburners of the importance of burning smart to reduce smoke output and to encourage upgrading older wood appliances to EPA-certified clean-burning models. Two neighbourhood pilot projects were delivered in Nova Scotia, and media were utilized to educate and promote the events. Old-technology and EPA-technology were used to demonstrate the marked difference in output and efficiency. Mall displays were held and financial incentives to trade-in old stoves were made available. **(2001/02 - $135K)**

In partnership with Natural Resources Canada - Nova Scotia Dept. of Natural Resources - Atlantic Wood Energy Technicians Association.

EnerGuide for Industry [Ref. 2002 - 330]

Canada

The EnergGuide for Industry provides comparative energy use information to engineers, financial officers and procurement officials with respect to commonly purchased "off the shelf" energy using products such as motors, transformers, lamps and ballasts. Based on the EnerGuide program, this activity provides information though various platforms, such as print, internet, databases, rating schemes and labels. **(2002-03 $428K)**

Energy Efficiency Standards for Equipment and Appliances [Ref. 2002 - 062]

New Brunswick

To actively regulate the existing energy efficiency standards under the Energy Efficiency Act, and review new standards that will result in the elimination of several supply streams of non-compliant equipment and appliances. New standards are being reviewed and will be considered for adoption. **($15K)**

NB Natural Resources and Energy, in partnership with the Government of Canada.

AP 2000 Accelerated Standards Action Program (ASAP) [Ref. 2002 - 329]

Canada

To encourage the supply and purchase of highly efficient energy using equipment. Through the promotion of endorsement labels, high performance procurement specifications, pilot incentive programs targetted at various levels in the product distribution chain and the deployment of more stringent energy efficiency standards, this Action Plan 2000 initiative intends to transform energy using equipment markets to high efficiency. **(2002-03 $5.7M)**

In partnership with manufacturers, retailers and utilities.

Recommendations from 2001 Nova Scotia (Residential wood heating) [Ref. 2002 - 042]

Nova Scotia

To increase the efficiency, safety and environmental impact of residential wood heating in Nova Scotia. The Strategy, through an extensive public consultation process, identified problems inherent with conventional wood heating systems and processes. Two recommendations were supported: 1. to adopt measures to prohibit the sale of non-EPA-certified wood heating appliances in Nova Scotia, and, 2. to adopt measures to prohibit the installation of residential wood-heating appliances by any individuals other than those with current WETT installer certificates.

(Nova Scotia Department of Natural Resources)

Solarwall® Demonstration Project [Ref. 2002 - 213]

Nunavut

To test the application of Solarwall technology in Nunavut and to assess its use in the North. A test project of a passive solar technology, which preheats air before it is drawn into a building's heating and ventilation system, will be conducted on a school in Rankin Inlet.

In partnership with Natural Resources Canada.

Senior's Housing Upgrades [Ref. 2002 - 044]

Saskatchewan

To invest in improvements to seniors' housing units through upgrades to ventilation, heating, hot water systems, doors-windows, lighting and electrical systems, and electric appliances. The upgrades will reduce energy use (costs) and GHG emissions. (Saskatchewan Housing Corporation) **($1M/yr. 2002 -06)**

In partnership with Municipal Affairs and Housing.

Prime Rate Loans [Ref. 2002 - 017]

SaskEnergy - Saskatchewan Natural Gas Distribution Utility

To facilitate over $18M in loans, to help Saskatchewan people (over 5,000 customers) reduce energy consumption. Prime interest rate loans, fixed for the term of the loan, are offered to residential customers to replace or install natural gas furnaces, boilers, unit heaters, water heaters, fireplaces, and clothes dryers. **(July 2001-July 2002; $1.4M)**

In partnership with Government of Saskatchewan, SaskEnergy Natural Gas Network Members, TD Canada Trust, Mechanical Contractors Association of Saskatchewan, Natural Gas Appliance and Equipment Dealers Association.

Neighbourhood Woodstove Change-out and Education Pilot Project [Ref. 2002 - 288]

Yukon

To replace old woodstoves with certified, efficient models, to promote efficient wood heating, and to encourage retailers to market and supply a greater volume of efficient woodstoves to shift market demand. The pilot project targets the replacement of 80 inefficient, residential woodstoves with new, certified models in the Riverdale neighbourhood of Whitehorse. A marketing campaign, rebates, retail promotion and special prizes will encourage consumer participation. The pilot project will also involve participating in a national public awareness campaign on efficient wood heating. (Yukon Development Corporation) **($75K)**

In partnership with Canada-Yukon Energy Solutions Centre, Government of Canada, City of Whitehorse, Yukon Conservation Society.

Objective *To improve energy efficiency for existing and new building stock.*

Commercial-Institutional Buildings Retrofit Initiative (CIBR) [Ref. 2002 - 039]

Canada

To encourage owners and operators of existing commercial and institutional facilities to reduce operating costs and energy use through investments in energy efficiency. The CIBR will offer further penetration into the sector by: a) providing access to a range of facilitation services to increase the awareness of opportunities; b) encouraging retrofit projects, using incentives, in organizations that can deliver high energy savings; and c) providing access to funds. (Natural Resources Canada) **(2001-02 $1.2M. 2002-03 $5.6M.)**

In partnership with Commercial and institutional building owners-managers (clients), member-based national organizations (partners), and energy management firms and consultants (allies).

Energy Efficient Housing Initiative [Ref. 2002 - 328]

Canada

To assist builders to improve the energy performance of their product, and consumers to consider high standards of energy performance. It is divided into two components aimed at the existing housing market and new construction. 1-EnerGuide for Houses offers an assessment of the energy performance and the EnerGuide label and rating indicates the level of performance. 2-The R-2000 Standard is a voluntary standard for the design, construction and certification of highly energy efficient, environmentally responsible and healthy houses.

Residential Heat Pump Program [Ref. 2002 - 331]

Manitoba Hydro

To promote the installation of geo-thermal heat pumps. The program includes capital financing (up to $15,000 and convenient pay back arrangements on electricity bills).

Energy Solutions in Building Design [Ref. 2002 - 291]

Yukon

To work with the private and public sectors to incorporate energy efficiency and renewable energy concepts and technologies in the design of new commercial and institutional buildings, as well as for major re-developments. The objective is to shift the market to incorporate energy solutions as a standard practice. (Yukon Development Corporation)

In partnership with the Government of Canada-Yukon Energy Solutions Centre.

Public Housing R-2000 Standard [Ref. 2002 - 134]

New Brunswick

To ensure that all new public housing is energy efficient and meets the R-2000 standards. (NB Natural Resources and Energy Department of Family and Community Services).

Diocese of Charlottetown's Enviro-Church Program [Ref. 2002 - 296]

Prince Edward Island

To reduce energy consumption, particularly the use of heating oil in institutional buildings on Prince Edward Island, through an energy auditing program (offered by Department of Development and Technology), for the 56 churches in the Charlottetown Diocese. Efficiency improvements could reduce annual consumption by an average of 10 per cent in each property, with a potential reduction of more than 300 tonnes of GHG emissions.

In partnership with the Environmental Coalition of P.E.I.

Energy efficiency programs [Ref. 2002 - 309]

Newfoundland and Labrador

To implement programs, such as R-2000, EnerGuide for Houses, and the Provincial Home Repair Program (delivered by the Nf. & Lab. Housing Corp). These programs include: delivery of energy audits for existing houses and buildings, the provision of incentives for energy efficiency improvements, such as the efficient lighting program, and the establishment of energy efficiency standards for appliances and equipment.

In partnership with the Newfoundland and Labrador Homebuilders Association.

Home Green Up and Home EnerGuide Programs [Ref. 2002 - 305]

Newfoundland and Labrador

To promote energy efficiency in the residential sector. About 500 homes were assessed so far with the EnerGuide software and 1300 others assessed through the Home Green Up program. The plan is to assess over 3000 homes within the next three years. The anticipated savings are estimated at $800 per house per year, with associated reductions of 2.3 tonnes of CO_2 per year. (Conservation Corps of Newfoundland and Labrador)

Commercial Energy Auditor Service [Ref. 2002 - 283]

Yukon

To perform energy audits for commercial and government clients and develop integrated energy plans for building owners that identify opportunities for energy savings as well as federal and territorial programs that could assist with their implementation. To date the service has trained and certified 12 commercial auditors based on the Canadian Institute of Energy Training. The training supports energy efficiency by improving technical skills and knowledge to help businesses, First Nations and municipalities improve building and community energy management. (Yukon Development Corporation)

In partnership with the Government of Canada-Yukon Energy Solutions Centre.

Green Building Design Initiative [Ref. 2002 - 286] *Yukon*

To promote and facilitate opportunities for green buildings that address the challenges of the northern environment by engaging, stimulating, and challenging Yukon architects to create innovative, inspired designs that harmonize building functions with sustainability, through a design competition for a commercial building. (Yukon Development Corporation)

In partnership with the Government of Canada-Yukon Energy Solutions Centre, the Yukon Arts Centre and Yukon architects.

Actions Under Consideration

Objective: *To promote good consumer choices through education and awareness and utilize existing expertise.*

Awareness Programs [Ref. 2002 - 308] *Newfoundland and Labrador*

To promote good consumer choices in building design, construction and maintenance.

Objective: *To improve energy efficiency for existing and new building stock.*

Straw-Fired Energy [Ref. 2002 - 301] *Prince Edward Island*

To investigate the use of locally grown straw as a fuel to provide thermal energy for district heating applications.

Model National Energy Code [Ref. 2002 - 275] *Newfoundland and Labrador*

To review and adopt new energy codes and energy efficient building standards.

In partnership with provincial and municipal governments.

National Building Retrofit Strategy [Ref. 2002 - 253] *Sierra Club of Canada*

To complete the design of a strategy that will foster energy efficiency in Canada's building stock and prepare a proposal for governments' approval. The proposal seeks (1) the creation of a National Better Buildings revolving fund for commercial and institutional buildings, (2) the provision of Tax Credits to homeowners for retrofits, and (3) the support of a National community-based home retrofit advisory service.

c) Electricity

The electricity industry has a significant presence within the Canadian economy. In 1997, it provided direct employment to approximately 80,000 people. Total revenues amounted to more than $25 billion and, from exports alone, revenues were about $2 billion.

Electricity is primarily an area of provincial jurisdiction with the federal role limited to nuclear energy and international and interprovincial trade. In most provinces, the industry is highly integrated, with the bulk of the generation, transmission and distribution provided by a few dominant utilities.

Electricity generation accounted for 17 percent of Canada's GHG emissions in 1999, and is projected to remain at that ratio by 2010, despite an overall increase in emissions.

In some provinces the electricity industry is responding to increasing competitive pressures and will likely undergo significant restructuring over the next decade. Such a change will heavily influence fuel choices and opportunities for GHG emissions reductions. In some jurisdictions, the restructuring of this sector is changing the traditional role and structure of utilities, opening markets and presenting both challenges and opportunities.

Electricity generators can play an integral role in Canada's climate change strategy as energy consumers, as developers of low GHG emitting sources of supply, and as participants in any potential domestic/international emissions trading scheme(s).

Objectives and Supporting Actions

a) **To integrate climate change considerations into short and long-term business decisions regarding capital investments, operations and processes** (through changes in tax treatment, performance standards, covenants, and participation in voluntary programs).

b) **To promote low-GHG emitting energy sources (such as natural gas) and the advancement of renewable energy use (including hydro), as well as cogeneration and innovative approaches to reducing emissions** (elimination of regulatory barriers, promotion of emerging low-GHG emission technologies and advancement of green power marketing).

c) **To incent improved energy-use and energy-management practices of local distribution companies**, recognizing regional differences (e.g. demand side management programs, performance-based regulation).

d) **To facilitate efficient energy-use behaviour of electricity consumers and the increased choice of alternative low emitting electrical energy sources** (e.g. partnerships to finance and deliver efficiency programs, encouragement of market development and demonstration projects of on-site renewable energy systems, stationary fuel cells, etc.).

GHG emissions reduction from this sector will require a mix of strategies, from adding alternative technologies to the existing generation mix, to investing in research, development, and commercialization of CO_2 sequestration technologies.

Several actions, already in place, are expected to reduce net GHG emissions; one prospective technology that is being explored is geological storage of emissions from generating stations. A number of jurisdictions are also addressing regulatory barriers to transmission, both within and between provinces, which could allow for the substitution of conventional hydro and high-efficiency gas-fired electricity generation to displace more carbon-intensive sources.

Many of the initiatives recently introduced are aimed directly at emission reductions. Wind power production incentive payments have been introduced, making this form of energy source a more competitive option for reducing emissions. The federal government is also considering expanding its tax incentives for renewable energy by raising the capacity limitations for small hydro-electricity projects to 50 MW from 15 MW. Companies, such as EPCOR, are demonstrating the effectiveness of emissions trading in mitigating the risk of climate change.

Jurisdictions such as Manitoba are converting some of their coal-fired generation to natural gas and Ontario is considering similar actions while others, like Saskatchewan, are promoting the use of flare gas in microturbines to generate electricity. In Ontario, two of the nuclear stations that were shut-down a few years ago, under the Ontario Hydro maintenance program, are now being considered for a restart. The nuclear station in New Brunswick is also being considered for an extension of its originally anticipated useful life cycle. Alberta has established a multi-stakeholder group to recommend strategies and approaches, such as standards, to improve the air emissions performance of this sector.

The Canadian Electricity Association is committed to action aimed at moving the sector to lower levels of emissions. It is currently engaged in negotiating agreements or convenants to make firm commitments to reduce GHG emissions intensity in exchange for a more stable investment framework.

Results Anticipated

To meet Canada's significant electricity demands and our climate change objectives, it will be important to draw on all electricity supply options – conventional technologies and emerging renewable technologies. The expected results are as follows.

- Increased sectoral energy efficiency and advanced new electricity generation technologies;
- Provision of net reductions in GHG emissions for the sector (including the exploration of geological storage of the emissions);
- Enhanced consumer awareness and improved regulatory processes.

Actions Approved and Underway

Objective: *To integrate climate change considerations into short and long-term business decisions regarding capital investments, operations and processes.*

Bruce A - Restart - Units 3 & 4 [Ref. 2002 - 006] — *Bruce Power*

To restart and place in service two 900 Mw nuclear reactors currently shut down under the former Ontario Hydro maintenance program. This entails environmental assessment and qualification of reactor and safety system components combined with modifications as necessary, safety analysis related to restart and refueling. **($340M)**

In partnership with British Energy, Cameco, Power Workers' Union, The Society of Energy Professionals.

Environmental Dispatch Premium [Ref. 2002 - 119] — *Manitoba Hydro*

To minimize thermal power generation, Manitoba Hydro has recently adopted and is applying an internal environmental dispatch premium. The net result of the premium is to reduce the operational use of thermal resources, which are producing GHG emissions.

Climate Change Mitigation for Genesee Phase 3 [Ref. 2002 - 169] — *EPCOR Utilities Inc.*

To offset the emissions associated with the Genesee Phase 3 Development (a 450 MW coal fired facility) to the equivalency of a natural gas combined cycle facility, on a corporate net basis. This amounts to roughly a 50% reduction in CO_2 emissions. This voluntary commitment has three facets to delivery: 1. Installation of supercritical boiler technology results in operating efficiencies. 2. Investment in renewable energy development. 3. Acquisition of emission reductions through emissions trading.

Objective: *To promote low-GHG emitting energy sources and the advancement of renewable energy use.*

Lakeview Regulation [Ref. 2002 - 248] — *Ontario*

To stop the use of coal at Lakeview Power Generating Station, a regulation (O.Reg 396/01) was introduced requiring Lakeview Generating Station to meet the same standard for clean energy as natural gas fired power stations, by April 2005. (Ontario Ministry of the Environment)

In partnership with Ontario Power Generation.

Wind Power Production Incentive [Ref. 2002 - 133]

Canada

To help establish wind energy as a full-fledged competitor in the electricity marketplace by 2008-2012 and make it a competitive option for reducing greenhouse gas emissions thereafter. The program will provide incentive payments for the first ten years of production of new eligible wind energy capacity, installed between March 31, 2002 and April 1, 2007. There will be a declining incentive from 1.2 cents per kilowatt-hour in the first year, to 0.8 cents per kilowatt-hour for projects commissioned in the last year. (Natural Resources Canada) **($260M over the next 15 years)**

In partnership with the wind energy industry, utilities and independent power producers.

Selkirk Generation Station Conversion to Natural Gas [Ref. 2002 - 101]

Manitoba Hydro

To convert two coal-fired units at Selkirk Generating Station to natural gas in 2002, to use a lower emitting source of energy and to reduce greenhouse gas emissions. **(2001/02 - $15M; 2002/03: $15M)**

Hydro-electricity Exports [Ref. 2002 - 122]

Manitoba Hydro

The export of renewable hydro-electricity displaces extra-provincial generation that would have been produced using fossil fuels. In 1990-91 Manitoba Hydro had net electricity exports of over 3,000 GWh. By 2000-01 the exports reached over 11,000 GWh. This substantial increase in exported energy has, and will continue to contribute to global reduction of greenhouse gas emissions.

Policy on Development of Hydro Sites on the Island [Ref. 2002 - 276]

Newfoundland and Labrador

Although the Island has some 50 sites that have a combined generation potential of approximately 1900 MW, at many of the sites the environmental impacts are considered unacceptable. The Electricity Policy options currently open for public consultation, conclude that flexibility in future generation selection should be retained to allow for changing public priorities on environmental issues. (Newfoundland and Labrador Hydro, Department of Mines and Energy)

Nova Scotia Energy Strategy – Renewable energy measures [Ref. 2002 - 205]

Nova Scotia

To create a regulatory and fiscal climate to encourage the growth of renewable sources of electricity generation in Nova Scotia. The Nova Scotia Energy Strategy identified the following measures. 1) Existing legislation governing the sale of electricity will be amended to allow independent power producers to sell renewable based electricity directly to retail customers. 2) A policy allowing net metering for small users will be formally adopted for electricity generated from renewable sources. 3) A green power rate structure will be created for all utility rate classes (the Province is committed to purchase a portion of its electricity use from green sources and will encourage other public agencies to do the same) 4) A voluntary renewable energy standard of 50 MW will be established 5) Information programs promoting the increased use of renewable energy will be expanded. (Nova Scotia Department of Natural Resources)

In partnership with Nova Scotia Power Inc and the wind energy industry.

Demonstration project: wind energy [Ref. 2002 - 281] — *Newfoundland and Labrador*

NeWind Group was awarded a contract for a demonstration project to determine the viability of wind generation. With the absence of interconnection to the mainland, the total potential for wind may be 150 to 200 MW. (Newfoundland and Labrador Hydro)

Flare Gas Pilot Project [Ref. 2002 - 010] — *Saskatchewan*

To conserve natural gas which would otherwise be flared into the atmosphere. The gas will be used to run two micro turbines to generate approximately 60 kilowatts of electricity to be delivered into SaskPower's electrical distribution grid by April 2002. Tests will be conducted as to the possibility of using the equipment for onsite generation. **($500K)**

In partnership with SaskPower, SaskEnergy, Flatland Exploration Ltd and Dennison Mines.

Renewable Power Sales Incentive Program (enhanced) [Ref. 2002 - 285] — *Yukon*

To displace fossil fuel heating sources by selling discounted, surplus hydroelectricity to commercial, industrial and government customers for heating purposes. The program also gives facility managers the opportunity to lease, with purchase option, renewable energy equipment. Recent facilities to join the program include: Whitehorse General Hospital, a new extended care facility, and two public schools. (Yukon Development Corporation)

In partnership with Canada-Yukon Energy Solutions Centre, the Yukon Energy Corporation and Yukon Electrical Co. Ltd.

Mayo-Dawson City Transmission Line [Ref. 2002 - 287] — *Yukon*

To displace primary diesel-generated power in the community of Dawson City with surplus, renewable electricity from the Mayo hydro generating station. A 223-kilometer transmission line will be constructed between the communities of Dawson City and Mayo with completion date scheduled for late 2002. This project has the potential to reduce up to 16,800 tonnes of greenhouse gas emissions per year. (Yukon Development Corporation) **($27M)**

In partnership with Yukon Energy Corporation.

Objective: *To promote improved energy-use and energy-management practices of local distribution companies.*

Greenhouse Gas Action Plan [Ref. 2002 - 013] — *Atomic Energy of Canada Limited*

To voluntary reduce greenhouse gas (GHG) emissions in AECL's Canadian operations. In 2000, AECL submitted an Action Plan to the Voluntary Challenge & Registry detailing the company's energy and emissions performance from 1990-1999 and setting an aggressive reduction target of 20 percent below 1999 levels by 2005. In 2001, AECL submitted an Action Plan Update reporting on its progress against that target and addressing measures that the company plans on implementing to achieve its future GHG reduction commitments.

Objective: *To facilitate efficient energy-use behaviour of electricity consumers and the increased choice of alternative low emitting electrical energy sources.*

Demand Side Management - Power Smart [Ref. 2002 - 072]

BC Hydro

To encourage energy savings through a portfolio of initiatives available to residential, commercial and industrial customers, the program assists residential customers to renovate or retrofit their homes, and provides referrals to pre-registered contractors who perform to Power Smart standards. Power Smart provides programs for commercial and industrial customers to audit their facilities and identify energy saving opportunities. Targeted savings are: 240 GWh in 2003, 450 GWh in 2004 and 500 GWh in 2005.

Price Signals [Ref. 2002 - 083]

New Brunswick

To send price signals that promote the efficient use of electricity by directing utilities to move away from declining block rate structures that encourage increased electrical use. (NB Natural Resources and Energy)

In partnership with NB Power.

Actions Under Consideration

Objective: *To promote low-GHG emitting energy sources and the advancement of renewable energy use.*

Improvements to the Tax Incentives for Renewable Energy - Small Hydro [Ref. 2002 - 038]

Canada

To encourage investment in small hydroelectric projects, including new run-of-the-river projects, and to complement provincial initiatives that have provided further opportunities for power producers to invest in small hydroelectric projects. The 2001 Federal Budget proposed an increase to the upper limit on the size of small hydroelectric projects that qualify for an accelerated capital cost allowance (CCA) rate of 30 per cent under Class 43.1 of the CCA regime. Small hydro-electric projects with a rated capacity not exceeding 50 megawatts (MW) will now qualify, up from the previous limit of 15MW. (Finance Canada)

Point Lepreau Nuclear Plant Refurbishment Program [Ref. 2002 - 004]

Énergie New Brunswick Power

A comprehensive technical and economic review of Point Lepreau determined that refurbishment in the 2006-2008 period is needed. The refurbishment requires the replacement of fuel channels, calandria tubes and other plant components in order to extend the station's operating life by 25 years. **($845M)**

New Legislation to Expand Manitoba Hydro's Conservation Mandate [Ref. 2002 - 090]

Manitoba

New legislation to promote other renewable resources including wind, solar and waste biogas. (Manitoba Finance)

Development of the Lower Churchill Hydroelectric Project [Ref. 2002 - 277]

Newfoundland and Labrador

Project would involve a 2000 MW generating station at Gull Island and possibly a future addition of 800 MW plant at Muskrat Falls with power transmission through Quebec. (Newfoundland and Labrador Hydro)

Replacement of Heavy Oil with Less GHG Emitting Fuels [Ref. 2002 - 278]

Newfoundland and Labrador

To replace the conventional 500 MW heavy oil power plant at Holyrood with a high efficiency combined cycle plant when natural gas is available on the Island. Simple refueling may be another alternative. (Newfoundland and Labrador Hydro)

Expansion of the North Cape Wind Farm [Ref. 2002 - 300]

Prince Edward Island

To continue the development of installed non-GHG emitting, electrical generating capacity on Prince Edward Island. The Prince Edward Energy Corporation (PEIEC), a provincial crown corporation, is the owner and operator of a 5.2 Megawatt wind farm commissioned in November, 2001. Most of the electricity generated is purchased, at a premium, for utilization in provincial and federal public building throughout the province. Approximately 20 per cent of this energy is available to the general public. Exceptional results have led PEIEC to formulate expansion plans that would double the generating capacity to 10 Megawatts by 2004.

In partnership with the Government of Canada and Maritime Electric Co. Ltd.

Low Impact Renewable Energy Strategy [Ref. 2002 - 255]

Pembina Institute/ Sierra Club of Canada

To design a proposal to support low-impact renewable energy development and to promote energy technologies like wind, solar and small scale run-of-the-river hydro technologies that do not produce air pollution or GHG emissions. Those energy sources could be developed with the provision of tax credits to producers and consumers and with the establishment of a federal agency to ensure a significant increase in the share of renewable energy in Canada's energy mix over the next 25 years.

Objective: *To promote improved energy-use and energy-management practices of local distribution companies.*

Encourage/facilitate cogeneration projects [Ref. 2002 - 206]

Nova Scotia

To encourage the development of independently owned/operated combined heat and power plants in Nova Scotia, in recognition of the significant improvement in energy efficiency that this technology offers, versus conventional single-cycle, fossil fueled thermal power plants. A Nova Scotia Electricity Marketplace Governance Committee provided its recommendations for implementing this measure by the end of 2002. Studies have indicated the potential cost effective opportunities to develop approximately 200 MW of combined heat and power within Nova Scotia. (Nova Scotia Department of Natural Resources)

In partnership with large institutional and industrial facilities in Nova Scotia.

Objective: *To facilitate efficient energy-use behaviour of electricity consumers and the increased choice of alternative low emitting electrical energy sources.*

Development of an Electricity Policy [Ref. 2002 - 279]

Newfoundland and Labrador

A Consultation document, "An Electricity Policy for the 21st Century: Options and Opportunities", was released by the Department of Mines and Energy, in March 2002. In addition to options for structural change, options for unbundled pricing may allow the distribution utility, Newfoundland Power, to consider promoting conservation without suffering loss of revenue.

d) Forestry (sinks)

At approximately 417 million hectares, temperate and boreal forests cover nearly half of Canada's land mass and represent about 10 percent of the world's forests. Canada's forests play a critical role in moderating our climate and filtering our air and water, and offer a place of sanctuary and recreation. Forests provide diverse habitats for about two-thirds of Canada's estimated 140,000 species of plants (180 species of trees), animals and micro-organisms.

Climate change represents a significant risk to Canadian forests due to expected changes in growing conditions. Much of Canada's forests could be altered in character and geographic distribution. Further, climate change is expected to lead to an increase in natural disturbances, such as forest fires and insect and disease outbreaks.

At the same time, however, carbon sequestered by Canadian forests ("sinks") could provide an important opportunity to reduce national emissions through afforestation, reforestation, and forest management. The agreement reached at the Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change (CoP6bis, held in Bonn, Germany in July 2001 and confirmed at CoP7 in Marrakesh in November 2001) provides clear international rules for obtaining credit for sustainable forest practices in calculating a country's efforts to meet its Kyoto Protocol emissions reduction target, including credits for these activities, as well as debits for deforestation. It is estimated that activities currently in place could provide for the annual sequestration of as much as 20 Mt of CO_2 by 2010.

Objectives and Supporting Actions

a) To position Canada to seize opportunities through the use of the sink provisions in the Kyoto Protocol.

b) To promote awareness and increase the understanding of the potential role of afforestation/ reforestation and forest management for carbon sequestration, to allow more informed decisions on the implementation of large-scale afforestation efforts.

c) To increase the understanding of causes and locations of deforestation, develop reporting capacity and mitigation measures.

d) To increase research capacity and measurement infrastructure to improve the understanding of the potential role of forest sinks under the Kyoto Protocol and the capability to report on sink activities.

With the rules for sinks established, attention has focused on ensuring Canadians will be able to take advantage of opportunities to increase carbon storage and reduce greenhouse gas emissions by modifying forestry practices, improving measurement capabilities and expanding capacity to absorb carbon dioxide through increased tree cover. Research and capacity development are key to achieving greater emissions reductions through the forestry sector. (Emissions reduction opportunities related to forest industry operations, such as pulp and paper and lumber, are addressed in the Industry section of this Business Plan).

Actions reported under this Plan vary from the promotion of awareness and understanding of the potential of carbon sequestration and forest management, increased tree planting on private lands and restocking of productive forest sites, to the adoption of best practices related to forest management, and improving capacity for inventorying forests and reporting on sinks activities.

Results Anticipated

- Better understanding of carbon sequestration that can be used to offset GHG emissions;
- Improved understanding of Canada's forest sinks potential;
- Better understanding of the roles of afforestation;
- Enhancement of silviculture activities as climate change mitigation strategies.

Actions Approved and Underway

Objective: *To promote awareness and increase the understanding of the potential role of afforestation/reforestation and forest management for carbon sequestration.*

Afforestation and Reforestation Initiative [Ref. 2002 - 035]

New Brunswick

The objectives of the initiative are to increase and maintain forestland. Under the afforestration initiative NB Natural Resources and Energy expects to plant 500ha of abandoned privately owned farmland per year. The crown land reforestation initiative targets approximately 10,000 ha for tree planting each year.

Protected Areas Strategy [Ref. 2002 - 132]

New Brunswick

To protect land areas in the province that are unique, including forested areas. The protected areas strategy includes the identification of the natural areas in the province, the conduct of socio-economic studies, public consultations, recommendations to government and, finally, the protection of areas. (NB Natural Resources and Energy)

Objective: *To increase research capacity and measurement infrastructure for a better understanding of forest sinks and ensure the appropriate reporting on sink activities.*

National Research Network on Afforestation and Agroforestry [Ref. 2002 - 127]

BIOCAP Canada Foundation

To ensure that the university research community contributes to national efforts aimed at understanding and implementing optimal strategies for using new forests (in particular, afforestation and agroforestry) as a sink for atmospheric CO_2 and as a source of biomass energy, chemicals and materials. BIOCAP will be coordinating, funding and communicating university research in the area of Afforestation and Agroforestry. The goal is to set up a National Research Network in Afforestation and Agroforestry that will deliver new technologies and important scientific and policy insights to meet the needs of government and industry. **(2001-04 approx. $1.0M)**

In partnership with the governments of Canada, Alberta, Ontario & Saskatchewan, Suncor, Shell, TransAlta, Ontario Power Generation, TransCanada Pipelines, Dofasco, Dupont, Al-Pac, Pollution Probe and Queen's University.

Actions Under Consideration

Objective: *To promote awareness and increase the understanding of the potential role of afforestation/reforestation and forest management for carbon sequestration.*

Best Forest Management Practices [Ref. 2002 - 023] ***Yukon***

To promote awareness and understanding of the potential role of reforestation and forest management for carbon sequestration by working with forestry stakeholders on developing and disseminating best management practices for the forestry industry. The work will include: inventory, timber supply analysis, fire action zone policy review, silviculture, and policy and legislation development. (Yukon Energy, Mines and Resources)

In partnership with Yukon First Nations and Yukon Forestry Industry.

Forest Sector Fund [Ref. 2002 - 031] ***Yukon***

To enhance the potential role of reforestation and forest management for carbon sequestration, by ensuring productive forest sites which were exempt from remediation prior to 1996, are promptly and effectively restocked. This program is linked to a fixed cash fund that will be established upon devolution of forest administration responsibilities to the Yukon government. (Yukon Energy, Mines and Resources) **($4.5M)**

In partnership with Yukon First Nations.

Objective: *To increase research capacity and measurement infrastructure for a better understanding of forest sinks and ensure the appropriate reporting on sink activities.*

Next Steps: Priorities for Manitoba's Forests [Ref. 2002 - 077] ***Manitoba***

To develop a sustainable forest strategy, including an ecologically based forest inventory and continued partnership in the Sustainable Forest Management Network and the Centre for Forest Interdisciplinary Research. East-side of Lake Winnipeg planning and new co-management initiatives would be a part of this work. Carbon sequestration could be reviewed through the analysis of Provincial Forest Inventory databases. (Manitoba Conservation)

e) Industry

Industry currently accounts for approximately 33 percent of Canada's GHG emissions and has taken voluntary actions to reduce GHG emissions for over a decade. The Canadian Industry Program on Energy Conservation (CIPEC) participants have improved their energy efficiency by an average of 1.3 per cent between 1990 and 1998. For information on these commitments, please refer to the Voluntary Challenge and Registry Program, ÉcoGESte and CIPEC. The actions in this Business Plan build on these accomplishments.

Canada's economy is unique. It is the most open economy of any G-7 country with trading in goods and services comprising about 75 percent of GDP. An outward-oriented economy like Canada's must be sensitive to the demands of the market and to the actions of its competitors, including those from both developed and lesser-developed countries. This is particularly true for resource-based goods, which comprise about 40 percent of Canada's exports, contributing substantially to the wealth and employment of Canadians, particularly in rural areas. Production of these goods, however, requires significant amounts of energy and it may be challenging to maintain and enhance our standard of living while reducing our absolute level of GHG emissions in those affected sectors.

In most industries, energy costs comprise less than 2 to 3 per cent of total costs. Some sectors, like agriculture and agri-food, are increasingly engaged in value-added production, with associated increases in energy use. As a result, investments to improve energy efficiency are often part of a larger investment decision to augment or change production capacity.

In more energy intensive industries, such as pulp and paper, steel and petroleum refining, energy savings have much more weight in the decision-making process. In the mining and metals sector, important energy efficiency gains and GHG emissions reductions have already been achieved. Enhanced voluntary actions and measures targeted at increasing recycling rates and the use of less GHG intensive materials will provide further opportunities for reductions. In the upstream oil and gas sector, rapid growth in both production and exports is anticipated, requiring special attention to emissions reduction opportunities. Additional activities proposed for the industry sectors are addressed separately in the sub sections e-i) (Minerals and Metals) and e-ii) (Oil and Gas).

There is considerable variation in GHG performance of the industrial sectors. Emissions intensity has decreased in almost all sectors. Emissions from the manufacturing sector have remained flat since 1980 while output has grown by over 50 percent. Despite substantial intensity improvements, emissions associated with upstream oil and gas development and transmission have grown, fuelled in large part by a significant increase in natural gas production and exports. Emissions from this sector are expected to continue to increase during the next decade, as new oil sands investments come on stream.

An overarching objective for the industrial sector is to maintain or enhance Canada's competitive position and its attractiveness as a location for investment. As a trading nation, much of Canada's wealth is built on the production and export of resources and energy-intensive goods. Industry faces increasing competitive pressures and thus seeks parity with competitors and unfettered access to traditional, as well as developing markets.

The following objectives aim to enhance existing voluntary efforts by industry and encourage innovation and market-based solutions. They focus primarily on harvesting near-term, win-win opportunities, while setting the stage for subsequent actions. The proposed activities help to remove some of the barriers encountered by companies in implementing energy efficiency and GHG reduction initiatives.

Objectives and Supporting Actions

a) **To raise awareness about climate change and identify cost-effective opportunities to enhance company competitiveness and GHG reduction performance;**

b) **To encourage investments in more energy-efficient, less emitting technologies and processes,** and recognizing regional differences, eliminate regulatory barriers and promote the use of cogeneration, fuel switching and alternative fuels;

c) **To promote further voluntary GHG emission reduction programs** through a framework that fosters industry participation in setting goals, recognizes efforts publicly, and facilitates the availability of capital for efficiency investments leading to emissions reductions.

In conjunction with trade association participation in CIPEC, the federal government is currently developing an emissions benchmarking website to promote further voluntary GHG emissions reductions and encourage Canadian industry to become more energy efficient. The introduction of the Small Business IDEA PROGRAM targets the environmental industry and provides financial assistance to small and medium-sized enterprises and non-profit organizations such as business associations. Jurisdictions, such as Manitoba, have developed eco-efficiency programs that identify process improvements opportunities in large industrial facilities in terms of energy, water, and solid waste emissions.

Results Anticipated

The results anticipated for the following industries (agri-food processing, chemicals, forest products, petroleum refining, small and medium enterprises and other manufacturing) are:

- Enhancement of knowledge within the those industries;
- Reduction of GHG emissions;
- Improvement of energy efficiency and achievement of environmental co-benefits.

Actions Approved and Underway

Objective: *To encourage investments in more energy-efficient, less emitting technologies and processes.*

Emissions benchmarking web site [Ref. 2002 - 158]

Canada

To promote further voluntary GHG emission reduction programs and encourage Canadian industry to become more energy efficient. In conjunction with trade association participation in CIPEC, NRCan will use benchmarking consultants to record data on businesses, including profitability, investment, financial management, productivity and innovation with special emphasis on energy efficiency and GHG performance. Industry Canada will develop a site on the Strategis web site to include sector reports, best practices, etc. (Industry Canada)

In partnership with the Canadian Industrial Program for Energy Conservation (CIPEC).

Gas Turbine Environmental Research Centre [Ref. 2002 - 184]

Canada

The National Research Council (NRC) is working with the three major industrial engine manufacturers to test and evaluate components and engage in applied R&D on improved aerodynamic efficiency, better numerical models, low emission combustors and the firing of engines with non-standard fuels.

In partnership with Pratt & Whitney Canada, Rolls Royce Canada, Siemens-Westinghouse, Environment Canada and the University of Alberta.

Small Business IDEA (Program for the Environmental Industry) [Ref. 2002 - 163]

Canada

The Small Business IDEA Program (IDEA-SME) is one of Canada Economic Development's (CED) key financial assistance program targeting small and medium-sized entreprises (SMEs) and non-profit organizations such as business associations helping SMEs. This financial assistance is repayable. Environment Canada is the program delivery agent for this program, which targets the environmental industry in Quebec.

Loan- Investment Programs [Ref. 2002 - 060]

Canada

To increase access to capital for small- and medium-sized entreprises where traditional financing is not available, primarily due to higher risk factors. High-growth, emerging sectors such as environmental industries, biotechnology, health, and knowledge-based industries are the prime focus. The primary sources of financing, facilitated through Western Economic Diversification, are loan funds established with various financial institutions, including chartered banks.

In partnership with financial institutions.

Enviroclub [Ref. 2002 - 164] *Canada*

To increase the knowledge, understanding and interest of SMEs with respect to pollution prevention and environmental management activities and for the SMEs to undertake on their premises an environmental project that may be economically viable. For a fee, a group of approximately fifteen SMEs can enroll for a year in an "Enviroclub". Participants receive: A diagnostic to identify potential environmental projects; skills development and information sharing sessions covering various environmental topics; access to environmental consulting expertise to help the firms undertake their selected environmental project. (Economic Development for Québec)

Environmental Supply Chain Management (ESCM) Pilot Project [Ref. 2002 - 154] *Canada*

To explore and develop the potential for supply chain management as a means to heighten small and medium sized enterprises (SMEs) awareness of climate change implications and to encourage SMEs to take part in various initiatives to track, better manage, and in the longer term to achieve meaningful reductions in GHG emissions. (Industry Canada)

Manitoba Hydro Power-Smart Eco-Efficiency Solutions [Ref. 2002 - 117] *Manitoba Hydro*

To identify process improvement opportunities that will result in reductions in energy, water use, wastewater, solid waste, greenhouse gas and other air emissions. A pilot program is to complete detailed eco-efficiency assessments at 15-20 Manitoba industrial facilities, drawn from at least three different industry sectors, by March 31, 2003. These detailed assessments will identify process improvement opportunities.

$mart Energy Management [Ref. 2002 - 297] *Prince Edward Island*

To reduce GHG emissions in Prince Edward Island's manufacturing and processing industries through energy efficiency, by providing a free energy auditing service. Each audited company receives a customized report describing recommended energy efficiency measures. (Department of Development and Technology)

Actions Under Consideration

Objective: *To raise awareness about climate change and identify cost-effective opportunities to enhance company competitiveness and GHG reduction performance.*

Best Industry Management Practices [Ref. 2002 - 029] *Yukon*

To promote voluntary emissions reductions by working with industry on developing and disseminating best management practices for the oil/gas and mining sectors. This proposed initiative would include the identification of opportunities for more energy efficient technologies and processes. (Yukon Energy, Mines and Resources)

In partnership with Industry stakeholders.

Objective: *To encourage investments in more energy-efficient, less emitting technologies and processes.*

EcoDesign Innovation (EDI) Pilot Project [Ref. 2002 - 160] ***Canada***

To assist small and medium enterprises, to become more productive through innovative process efficiency improvements, thereby reducing environmental impact and GHG emissions. The EDI provides cost-sharing with participating companies of a consultant's fee for a two-stage process to identify significant opportunities. Reduction of fuel and electricity consumption is a major result of efficiency improvements. (Industry Canada)

In partnership with NRC/IRAP, Science Council of BC, Canadian Environment Industry Association – BC Chapter

Industrial Sector Air Quality Plan [Ref. 2002 - 251] ***Ontario***

To assist the province in meeting its air quality targets for the Anti-Smog Action Plan (45% reduction in NOx and VOCs by 2015), Canada Wide Acid Rain Strategy for Post 2000 (50% reduction in SO_2 by 2015), and Canada Wide Standard for ozone and fine particulates (by 2010). The program is expected to have significant co-benefits, including GHG reductions. (Ontario, Ministry of the Environment)

In partnership with industry, NGOs and other jurisdictions (federal and municipal).

Refrigerant Regulation (O.Reg 189/94) [Ref. 2002 - 246] ***Ontario***

To prevent the release of halocarbon gases from refrigeration and air conditioning equipment through technician training, proper service practices and refill prohibitions. This regulation governs the use of halocarbon gases as refrigerants and is primarily aimed at the users and handlers of these gases. Under this regulation, technicians must be trained, use proper service and disposal procedures and must report large releases (100 Kg or greater). In addition, MOE has prohibited the refill of mobile comfort air conditioning systems with chlorofluorocarbons (CFCs) (approximately 35% of the total CFCs released to the atmosphere). (Ontario, Ministry of the Environment)

In partnership with Industry groups, equipment manufacturers, service technicians, other ministries/governments and ENGOs.

e-i) Minerals and Metals

The minerals and metals sector in Canada employs over 350,000 people. The sector's output of base and precious metals, primary iron and steel, aluminum, magnesium, secondary metal products, lime, cement and concrete provides raw materials to every economic sector in the country and supplies important export markets.

To remain cost competitive in the global marketplace, this sector continues to invest in new technologies to enhance its energy efficiency, as well as its overall environmental performance. Despite significantly increased production throughout the 1990s, in 1999 emissions decreased slightly and by 2010, under a business-as-usual scenario involving increased production levels and existing industry commitments, total direct greenhouse emissions are projected to remain relatively unchanged.

Objectives and Supporting Actions

a) **To build on the track record and positive future commitments by the sector.**

b) **To encourage indirect approaches to reducing GHG emissions** (e.g. by increased recycling of steel, aluminum and magnesium, by increased use of concrete in roads and by increased use of supplementary cementing materials to replace cement in concrete).

For example, the aluminum industry continues its efforts to reduce greenhouse gas emissions and acts in a proactive manner in this respect, while preserving the industry's growth potential. The Aluminum Association of Canada and its member companies recently signed a framework agreement with the Quebec government on GHG emissions reduction. Each company will set reduction targets considering its own circumstances. The plan advocates a life-cycle approach to emphasize the value of using and re-using aluminum. The promotion of activities related to aluminum recycling and energy efficiency are also among the means under consideration to achieve GHG emissions reduction targets.

Norsk Hydro Canada conducted conclusive tests on one of its magnesium casting line, in 2001, using SO_2 rather than SF6. The company is now considering this technology to completely eliminate SF_6 from its process, reducing GHG emissions by one megatonne of CO_2 equivalent per year.

Results Anticipated

- Reduced GHG emissions;
- Provision of environmental co-benefits. (e.g., through increased recycling and increased use of concrete in roads);
- Increased knowledge and understanding of ways to reduce GHG emissions.

Actions Approved and Underway

Objective: *To build on the track record and positive future commitments by the sector.*

Voluntary Agreement with the Gov't of Quebec [Ref. 2002 - 207]

Aluminum Association of Canada

To improve the aluminum industry's performance in terms of GHG emissions by recognizing the level of reductions already achieved and securing additional reductions while allowing for growth in the industry. An annual (or multi-year) emission target will be established as part of an overall commitment. The targets will be established on the basis of technologies used and will take into consideration the efforts already expended and the means available to achieve the GHG emission reductions.

In partnership with the Government of Quebec.

Actions Under Consideration

Objective: *To build on the track record and positive future commitments by the sector*

Elimination of SF6 Emissions [Ref. 2002 – 303]

Norsk Hydro Canada

To completely eliminate the process related GHG emissions from its operations, Norsk Hydro Canada conducted conclusive tests, in 2001, on one of its magnesium casting line using SO_2, rather than SF_6. (As a greenhouse gas potential, one tonne of SF_6 is equivalent to 24 000 tonnes of CO_2). Since 1990, the company reduced its use SF_6 by 85 per cent, for a net emission reduction of 1.3 Mt. Eliminating completely the SF6 would reduce the company's emissions by another one megatonne of CO_2 equivalent per year.

Objective *To encourage indirect approaches to reducing GHG emissions.*

EcoSmart Concrete Project [Ref. 2002 - 171]

Canada

To reduce the CO_2 footprint of concrete by increased use of supplementary cementing materials as a replacement for cement. (Every tonne of cement replaced by SCMs represents nearly one tonne of CO_2 emissions prevented). The project is designed to overcome technical, operational and perceptual barriers to the increased use of supplementary cementing materials as a replacement for cement in concrete. (Industry Canada)

In partnership with Greater Vancouver Regional District Cement/Concrete Industry and Green Building Industry.

e-ii) Oil and Gas

Canada's upstream oil and gas sector is a $52 billion per year industry that employs 241,000 people either directly or indirectly. It accounts for 28 per cent of industrial GHG emissions from activities such as production, transmission, processing, and distribution. The sector contributed $26 billion to Canada's trade surplus of $54 billion in 2000. Natural gas exports have increased almost 250 percent since 1985.

From 1990 to 2000, Canadian crude oil production increased by about 40 per cent and is expected to further increase to more than double the 1990 level of production by 2010. Additional oilsands projects in Alberta and some East Coast offshore oil developments account for the majority of the increase. Canadian natural gas production followed a similar pattern and increased by about 70 percent between 1990 and 2000. The sector is expected to more than double the 1990 production by 2010.

Increased capacities have contributed to reduce global emissions by displacing more emissions intensive energy sources in the US. Despite a decline in average emissions intensity with improved production technology, the anticipated increases in production more than outweigh the per unit gains in emissions intensity and, consequently, GHG emissions are rising.

The upstream oil and natural gas sector constitutes one of the cornerstones of the Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.). Companies from this sector were founding members of this company-level voluntary initiative. Participants have implemented 307 projects since 1999 and reduced emissions by 13 Mt.

Objectives and Supporting Actions

a) To broaden government/private sector collaboration in research, demonstration and commercialization of carbon dioxide (capture and storage) management.

b) Through continuous technology and operational improvements, continue to reduce emissions intensity and exceed competitors' emission intensity benchmark.

c) To broaden voluntary reductions and offsets through codes of best practices and participation in government/private sector programs.

The large oil and gas companies have substantially reduced their emissions intensity and have made commitments to further reductions in the future. For example, Syncrude has reduced greenhouse gas emissions per barrel by two percent per year and expects a 38 percent reduction in emissions per barrel between 1990 and 2008. Total greenhouse gas emissions for Petro-Canada are 9 percent lower than in 1990, despite a 34 percent increase in production. They have committed to ongoing improvements of one percent per year in energy efficiency through 2005. Suncor has also achieved similar reductions in emissions per unit of production and has also committed to invest $100 million over five years to develop a new Alternative and Renewable Energy Business. It is partnering with others to develop carbon dioxide capture and storage technologies.

Results Anticipated

- Reduction of non-energy related emissions such as fugitive emissions;
- Development of a carbon management strategy;
- Development of carbon dioxide capture and storage technologies (mainly for use in enhanced oil recovery);
- Improvement in greenhouse gas emissions intensity, resulting in direct reductions.

Actions Approved and Underway

Objective: *Through continuous technology and operational improvements, to continue to reduce emissions intensity.*

CO_2 - EOR demonstration projects [Ref. 2002 - 172] — ***Alberta***

To research, develop and demonstrate new and emerging climate change technologies related to the CO_2 capture, transportation and storage in resevoirs, offset by enhanced oil and gas recovery.

In partnership with Industry, Alberta Research Council and the Government of Canada.

Objective: *To broaden voluntary reductions and offsets through codes of best practice and participation in government/private sector programs.*

Amendment of Drilling and Production Regulation Under The Oil and Gas Act [Ref. 2002 - 108] — ***Manitoba***

To ensure that emissions from all oil and gas facilities complies with Manitoba air quality objectives. This initiative may require flaring or sweetening of gas at some facilities where raw gas is currently vented. (Manitoba Industry, Trade and Mines)

Oil Sands SAGD (steam-assisted gravity drainage) project at MacKay River, Alberta. [Ref. 2002 - 045] — ***Petro-Canada***

To implement a natural gas-fired cogeneration power plant facility to improve energy efficiency of the SAGD project and reduce greenhouse gas emissions. Because of the high demand for steam in a SAGD, natural gas that would have gone to boilers will now be directed to turbines; exhaust heat from the turbines will be converted to steam. The MacKay River plant will use 13 MW of power from the cogen, while the remaining 152MW of power will be directed back to the Alberta grid. This substitutes low-emission electrical power, versus current coal-fired power, and overall provincial-global CO_2 emissions are reduced. **(Capital cost estimated at $135M)**

In partnership with the MacKay River oil sands facility; Trans Canada Energy Ltd. to operate the cogen plant.

Natural Gas Expansion [Ref. 2002 - 268] — ***New Brunswick***

To increase the availability of natural gas by supporting the development of a natural gas infrastructure. This is accomplished by actively participating in regulatory hearings and working with large potential customers that could serve as anchor loads. (NB Natural Resources and Energy).

Actions Under Consideration

Objective: *To broaden voluntary reductions and offsets through codes of best practice and participation in government/private sector programs.*

GHG Reductions Best Practices [Ref. 2002 - 074] — *Canadian Gas Association – National*

To promote the adoption of leading practices to reduce natural gas delivery related emissions. A survey of CGA members to identify practices and approaches applicable to other Canadian companies is being considered.

Information and Incentive Programs to Promote the Wise Use of Natural Gas [Ref. 2002 - 075] — *Canadian Gas Association – National*

To assist consumers in adopting energy efficiency practices. The CGA Local Distribution Companies provide information and incentives to help consumers achieve its objective.

In partnership with Local Distribution Companies.

Gas Industry GHG Audit and Baseline Assessment [Ref. 2002 - 076] — *Natural Gas Delivery Industry*

To ensure the industry is using comparable methodologies to assess GHG emissions. Audits and recommendations on measures to improve reporting and measurement are being considered.

In partnership with the Gas Research Institute.

f) Municipalities

Municipalities, including both urban and rural communities, have direct control over approximately 7 percent of Canada's GHG emissions, through their own operations (e.g. waste management, landfills, building and facilities, street lighting, vehicle fleet). They also influence over half of Canadian emissions through their role in the community at large. Municipalities are in a position to achieve significant GHG reduction opportunities while creating multiple local co-benefits for Canadians, such as clean air and new jobs.

Canadian municipalities have frequently demonstrated their desire and resolve to undertake activities, and deliver programs to reduce GHG emissions and to adapt to climate change. Municipal information-sharing, the development of expertise and the sharing of best practices occur informally and through provincial/territorial, national and international networks and associations, such as the Federation of Canadian Municipalities (FCM) and the Toronto-based International Council for Local Environmental Initiatives (ICLEI).

For example, the FCM's Partnership for Climate Protection (PCP) has enrolled over 90 Canadian municipalities in a five-stage program to provide them with tools needed to undertake a sustained emissions reduction effort.

In order to stimulate municipal GHG reductions opportunities, there are two **separate but complementary programs created and funded by the federal government and managed by the FCM: The Green Municipal Enabling Fund and the Green Municipal Investment Fund.**

Many actions and activities related to municipalities are also included in other sectors such as Transportation and Buildings.

Objectives and Supporting Actions

a) To build the capacity for municipal governments and communities to address climate change and undertake both mitigation and adaptation responses.

b) To reduce GHG emissions from municipal operations.

c) To engage municipal governments and communities in the strategy of enhancing awareness and understanding, as well as encouraging them to take action.

In 2001, the Federal Budget doubled the Green Municipal Enabling Fund (GMEF) from $25 million to $50 million and the Green Municipal Investment Fund (GMIF) from $100 million to $200 million. The five-year GMEF provides grants to support innovative feasibility studies and covers up to 50 per cent of eligible costs to a maximum of $100,000. The GMIF is a permanent revolving fund that provides loans to municipalities to finance project implementation.

Since their creation in 2000, there have been three full funding rounds, resulting in the approval of 152 projects. The funds support of over $10 million for these projects has leveraged over $46 million in partnership spending to act on cleaner air, water, soil and climate change. It has provided funding for studies in eleven municipalities (large and small), looking at ways to reduce and capture landfill gas emissions, including the use of biogas to produce green energy. Other approved projects range from funding a feasibility study to implement a wind-power energy project that provides electricity for the municipal building in Ville de Lamèque, New Brunswick, as well as studies on how to develop community energy systems in Sudbury, Ontario and Prince George, British Columbia.

Results Anticipated

- An increase in the number of municipalities/communities engaged in GHG reductions, both in their own operations and in the community at large;
- An enhanced municipality and community participation in engagement and outreach.

Actions Approved and Underway

Objective: *To build the capacity for municipal governments and communities to address climate change and undertake both mitigation and adaptation responses.*

Grande Prairie Combined heat and power [Ref. 2002 - 261] — *Alberta*

To evaluate the potential of recovering waste heat from Canadian Gas & Electric Co. Ltd power co-generation plant using wood waste from Canfor's sawmill site. The project will look at the feasibility of using the excess heat to heat buildings in the city and will determine the type and cost of systems needed to efficiently transfer this excess heat.

In partnership with the Climate Change Central, City of Grande Prairie, Canadian Gas and Electric, ATCO gas and the Federation of Canadian Municipalities.

Partners for Climate Protection [Ref. 2002 - 040] — *Federation of Canadian Municipalities*

To provide participating municipalities with tools to undertake a sustained effort to reduce GHG emissions. The Program, which sets out a process with milestones, includes: 1) Undertake a GHG inventory for the participating municipalities and for the community-at-large; 2) Set a GHG emission reduction target; 3) Develop a local action plan; 4) Implement the plan; and 5) Monitor and verify GHG emission reductions. Tools are provided at the various stages.

In partnership with the Climate Change Action Fund, Environment, Health and Natural Resources Canada.

Objective: *To reduce GHG emission from municipal operations*

Canada-Manitoba Infrastructure Program [Ref. 2002 - 110] — *Canada-Manitoba Infrastructure Secretariat*

To invest in urban, rural and northern municipal infrastructure projects that could potentially lead to GHG reductions in solid waste or increase energy efficiency. The main focus is green municipal infrastructure and includes projects to protect and/or enhance the quality of our environment (e.g. water and wastewater systems, solid waste, energy efficiency). (Canada-Manitoba Infrastructure Secretariat) **($180 M)**

In partnership with Manitoba Government and the Government of Canada.

Green Municipal Funds [Ref. 2002 - 252] — *Federation of Canadian Municipalities*

To stimulate investment in innovative municipal infrastructure projects and practices, and to improve the environmental performance of Municipalities. Two separate but complementary Funds are managed by the Federation of Canadian Municipalities. The Green Municipal Enabling Fund, a five-year, $50 million fund that provides grants to support innovative feasibility studies (grants cover up to 50% of eligible costs to a maximum of $100,000) and The Green Municipal Investment Fund), a $200 million permanent revolving fund that provides loans to municipalities to finance implementations.

In partnership with National program available to all municipal governments and their partners.

Landfill Gas Utilization Study [Ref. 2002 - 126]

Manitoba Hydro

To determine the potential for reducing GHG emissions from the City of Winnipeg landfill sites through the flaring or utilization of landfill gas. Manitoba Hydro funded a pre-feasibility study of the potential for reducing emissions from those sites. In addition to flaring of landfill gas, the study also considered utilization of the gas for heating and electrical generation.

City of Regina Green Ribbon Committee [Ref. 2002 - 322]

City of Regina

To identify and recommend initiatives which can be undertaken by the community to achieve an overall reduction in community-wide greenhouse gas emissions. The Committee investigates options for reduction of emissions and potential barriers to action. They are currently developing an Action Plan for the reduction of Regina's emissions.

In partnership with representatives of the University of Regina, Provincial Crown Corporations, Private Industry and Business, Government of Saskatchewan, Separate and Public City School Boards, and other local organizations.

Energy Efficiency in Municipalities [Ref. 2002 - 310]

Newfoundland and Labrador

Energy control system in place at the City of Mount Pearl. Retrofit of city infrastructure in the City of St. John's. Purchase of EnerGuides - pilot project at the City of Corner Brook.

Waste Management Strategy [Ref. 2002 - 280]

Newfoundland and Labrador

The Department of Environment is promoting a waste management strategy to reduce solid waste by 50%, by replacing community dumps and waste incinerators with regional landfill sites. The Multi-Materials Stewardship Board also encourages and promotes waste diversion from landfills, including deposit-refund programs for beverage containers, tires and used oil.

g) Transportation

Transportation is a large and diverse sector which is comprised of mobile emissions sources including urban, inter-urban and rural transportation, as well as emissions from the aviation, marine and rail sectors. The transportation sector accounts for approximately 25 per cent of Canada's GHG emissions, 30 per cent of which being associated to aviation and freight (heavy trucks, marine and rail).

The sector is expected to be one third above 1990 levels by 2010. Most of the anticipated growth, between 1990 and 2010, is in trucking, aviation and off-road uses.

Transportation actions are aimed at three specific areas: changing public behaviour to make transportation systems more efficient, developing more efficient vehicles, and increasing the use of less carbon-intensive fuels.

Climate change is also important to this sector because of the potential impacts and adaptive requirements it may impose on transportation infrastructure. In northern Canada, for example, shortening of ice road seasons and changes to permafrost depth require adaptation in road choice and construction design.

Continuous modernization of the transportation system to ensure efficient movement of people and goods is essential to Canada's competitiveness and trade as well as an improved quality of life. Moreover, as each order of government has jurisdiction over different aspects of the systems, changes in transportation policy require coordination and flexibility in addressing regional variations and unique urban/rural challenges.

Urban transportation measures intersect with municipal measures more directly than rural measures; however, rural transportation and municipal planning are not mutually exclusive. While measures are mainly addressed under transportation, they also have links to municipal planning, communications and related actions. In addition, those measures require coordination with actions to address other air quality issues and other urban issues, such as congestion and safety.

Emerging technologies to improve the many transportation components (infrastructure, vehicles, fuels and intermodal integration) are critical to any transportation-related strategy. While new technologies tend to impact over the longer term, short term reductions will largely be driven by behavioural changes. The overall approach must, consequently, include a mixture of behavioural changes, infrastructure modifications and technology development.

Objectives and Supporting Actions

a) **To encourage behavioural change** through increased public awareness, promotion of changes in driving habits, reduced use of cars and the deployment of voluntary commercial best practices.

b) **To increase use of more efficient and integrated transport systems** to reduce congestion, improve traffic flow, encourage the efficient movement of goods and increase the use of public transit.

c) **To promote increased fuel efficiency and use of less carbon-intensive fuels** through improved vehicle technologies, fuel quality and support for the production and distribution of alternative fuels.

d) **To improve the understanding of how climate change could affect Canada's transportation systems**, particularly in the North, coastal regions, marine, and shipping on the Great Lakes and St-Lawrence.

Many initiatives and actions have been in place for some time and, among the more recent ones, there has been promotion and enforcement of a number of no-idling policies in Ontario. Some of these policies also promote the "wise use" of vehicles to reduce GHG emissions, such as the retirement of high polluting vehicles or poorly maintained engines. In Halifax, an education program has recently been introduced to reduce the use of single occupancy vehicles and to encourage public transportation.

Many jurisdictions are also encouraging the production and use of a renewable alcohol blend in gasoline, as well as seeking improvement of transportation choices within and between communities. In Manitoba, an information exchange network is being established to address climate change impacts and identify adaptation strategies for northern transportation infrastructure.

Results Anticipated

- Expansion of public transportation infrastructure;
- Efficiency improvement of the transportation system;
- Development of advanced transportation technologies, including intelligent transportation systems (see Section IV, Promoting Technology Development & Innovation);
- Expanded studies of fuels, fuel efficiency and energy management;
- Enhancement of public awareness of transportation alternatives.

Actions Approved and Underway

Objective: *To encourage behavioural change.*

Transportation Halifax (TRAX) [Ref. 2002 - 199]

Ecology Action Centre

To reduce the use of single occupancy vehicles in metro Halifax and to encourage mass transportation/car pooling/walking/bicycling as viable healthy alternatives. Existing effective public transportation initiatives will be supported and efforts maintained to encourage legislation that will expand the use of efficient public transportation.

(2001/02 - $100K / 2002/03 - $100K)

In partnership with the Government of Canada, EcoAction, M.O.S.T., Nova Scotia Dept. of Natural Resources, Halifax Regional Municipality, and Friends of the Environment Foundation.

Public and Industry Outreach on Climate Change and Transportation [Ref. 2002 - 222]

Manitoba

Delivery of climate change-transportation presentations to conferences, stakeholders and industry associations, universities graduate seminars, departmental and interest group/service club meetings. (Manitoba Transportation and Government Services)

University of Alberta Solar Car [Ref. 2002 - 264]

Alberta

The University of Alberta's Department of Engineering designed, constructed and raced a solar powered car. In conjunction with the car, the University also delivered an educational program that was targeted at secondary students. The goal of this project is to enhance University and public education, raise awareness of energy efficiency and alternative energy sources (namely solar power), and develop sustainable transportation technology.

In partnership with the University of Alberta Department of Engineering and over 30 other participants.

STEER [Ref. 2002 - 311]

Newfoundland and Labrador

To educate taxi drivers about fuel efficiency in St. John's.

In partnership with St. John's Taxi Association.

Moving On Sustainable Transportation (MOST) Program [Ref. 2002 - 073]

Canada

To stimulate the development of innovative methods to decrease the impact of transportation on the environment, to achieve quantifiable results and provide Canadians with practical information and tools to apply sustainable transportation thinking to their daily lives. The MOST program supports projects that produce the kinds of education, awareness and analytical tools needed to make sustainable transportation a reality. (Transport Canada)

$2.5M over five years (2002-2007)

In partnership with Not-for-profit, non-governmental and community organizations; organizations for First Nations and Aboriginal Peoples; educational and academic institutions and labour organizations.

Enerpool Program [Ref. 2002 - 295] *Prince Edward Island*

To demonstrate the effectiveness of ride-sharing transportation (and its related emissions reductions), the Enerpool Program is a weekday ride-sharing program to commute to and from Charlottetown. A study is now underway to examine the feasibility of expansion of the system.

Objective: *To increase use of more efficient and integrated transport systems.*

SmartStart [Ref. 2002 - 167] *The Railway Association of Canada*

To conserve fuel and reduce emissions by routinely shutting down locomotives when they are not in use, and automatically powering them up only when they are again required. For a locomotive in-service (in use or idling) 20 hrs/day, this initiative pays for itself in fuel savings over a 12 to 14 month period; average per month saving in locomotive fuel expenditure of $1500 (which is 36% of total monthly fuel bill). **($20,000-$25,000 per unit)**

In partnership with Canadian National Railways and Canadian Pacific Railways and Shoreline Railways.

Smart Growth - Transportation Initiative/Smart Growth – Transit [Ref. 2002 - 247] *Ontario*

To promote and manage growth in ways that sustain a strong economy, build strong communities and promote a healthy environment. Smart Growth focuses on managing growth and development to ensure that the planning and building of vital infrastructure – such as roads and highways, public transit, and electricity, water and sewage treatment services – maximize efficient use of existing infrastructure and is well co-ordinated locally and regionally. Smart Growth is a vision for all communities, large and small. In urban areas, Smart Growth initiatives will deal with the problems of rapid growth – like gridlock – while promoting economic growth and a healthy environment. (Ontario Ministry of the Environment) **($500M approved, $3B (dependent on parallel commitments)**

In partnership with Municipalities and the public.

Urban Transportation Showcase Program [Ref. 2002 – 198] *Manitoba*

To demonstrate innovative ways to reduce GHG from urban transportation activities. (Manitoba Transportation and Government Services)

In partnership with the City of Winnipeg.

Objective: *To promote increased fuel efficiency and use of less carbon-intensive fuels.*

Ethanol Blended Tax Relief Program [Ref. 2002 - 216] *Manitoba*

In Manitoba, a tax forgiveness of 2.5 cents per litre is allowed for blends of 10 per cent alcohol in gasoline sold in the province of Manitoba. The alcohol must be derived from biomass materials, denatured and contain not more than 1 per cent water. The tax relief applies only to the gasoline containing alcohol that is produced and consumed in Manitoba. (Manitoba Finance)

Drive Clean - Phase 3 [Ref. 2002 - 245] — *Ontario*

To reduce smog and GHG emissions by targeting vehicles that are heavy polluters due to poorly maintained engines, or those that operate without properly functioning emission control equipment. The program first became mandatory in April of 1999 and testing in 2001 covers urban centres and their commuting zones from Peterborough to Sarnia, including the Niagara Region. On July 1, 2002 (phase 3), the program will be expanded to include the entire "smog zone" in southern Ontario, from Windsor to the Quebec border. (Ontario, Ministry of the Environment)

In partnership with Drive Clean facilities.

Freight Sustainability Demonstration Program [Ref. 2002 - 085] — *Manitoba*

To assist in the introduction of energy conservation measures in the transportation sector. This initiative advocates for and assists Manitoba stakeholders in accessing federal programs promoting energy-reducing measures.

(Manitoba Transportation and Government Services)

Canadian Transportation Fuel Cell Alliance (CTFCA) [Ref. 2002 - 084] — *Manitoba*

To promote the development of, and advancing opportunities, for hydrogen transportation fuel infrastructure for heavy and light duty vehicles. Charter member of core committee and participating on several sub-committees. Hosted the Canadian Transportation Fuel Cell Alliance Workshop in Winnipeg, September 2001.
(Manitoba Transportation and Government Services)

NASCO Alternative Fuel Sub-Committee [Ref. 2002 - 210] — *Manitoba*

To advance alternative fuel infrastructure along Hwy 75/129 between Winnipeg, Manitoba and Texas.

(Manitoba Transportation and Government Services).

Greenprint for Ethanol Production [Ref. 2002 - 321] — *Saskatchewan*

To create an environment for private sector development of an ethanol industry in the province of Saskatchewan by providing support through tax incentives and legislation. A fuel tax exemption for ethanol produced and consumed in Saskatchewan by way of a rebate would be established. Other goals outlined include legislation to permit mandating of ethanol-blended gasoline sales; working with producers to encourage establishment of ethanol facilities; working with wholesalers and retailers to develop a market for ethanol-blended fuel.

Objective: *To improve the understanding of how climate change could affect Canada's transportation systems.*

Northern Transportation Infrastructure Climate Impacts and Adaptation [Ref. 2002 - 088] — ***Manitoba***

Northern Infrastructure Climate Impacts and Adaptation Information Exchange Network will be established. Information session on impacts and adaptation in northern transportation infrastructure, including winter roads.

Northern Transportation and Climate Change Trends [Ref. 2002 - 087] — ***Manitoba***

To examine climatological and statistical trends in climate data in relation to climate change. (Manitoba Transportation and Government Services)

In partnership with Prairie Adaptation Research Collaborative.

Actions Under Consideration

Objective *To encourage behavioural change.*

Longs Creek Scale Weigh-In-Motion Project [Ref. 2002 - 136] — ***New Brunswick***

To enhance truck traffic flow and efficiency by requiring only trucks suspected in violation of weight and dimension regulations to be diverted 6 kms from the highway to the scale facility. The Weigh-In-Motion scale will collect a variety of data from each commercial vehicle, including gross vehicle and axle weights, number of axles and axle spacing, speed, date and time of vehicle passage, as well as overall length, vehicle classification to determine whether a vehicle is in violation and should proceed to the scale facility. This enhances the flow of vehicles and minimizes the chance of line ups at the scale. Vehicles in compliance proceed without a 3 kilometre detour. (NB Natural Resources and Energy Department of Transportation).

In partnership with private sector suppliers and service providers.

Objective: *To increase use of more efficient and integrated transport systems.*

Sustainable Transportation Fund [Ref. 2002 - 254] — ***David Suzuki Foundation***

To design and develop a separate sustainable transportation funding proposal to support investments in public transit infrastructure, to reduce the negative impact of automobile and passenger transportation on the atmosphere, air quality and human health. This proposal calls for the establishment (particularly light rail commuting systems) and service improvements. The fund could be used to support investments in alternative urban design and other sustainable modes of transportation.

Transportation Emission Reduction Initiatives [Ref. 2002 - 267] — ***Manitoba***

A number of initiatives related to emission reduction, including: Fleet Vehicle and Heavy Equipment Project, WinSmart UTSP project phase 2, eWork Strategy,and the Vehicle Scrappage Project.

Objective: *To promote increased fuel efficiency and use of less carbon-intensive fuels.*

Ethanol Production [Ref. 2002 - 299] — ***Prince Edward Island***

To promote the development and use of low-GHG emitting transportation fuels on Prince Edward Island. A major source of GHG gas emissions on Prince Edward Island is attributed to the transportation sector that has limited alternatives for mitigation. The Province is presently investigating the development of ethanol from local crops to be used as an additive to automotive fuels.

Alternative Transportation Fuel Technology [Ref. 2002 - 266] — ***Manitoba***

A number of initiatives related to alternative fuel technological development, including: Green Corridor Development, Manitoba Biodiesel Heavy Engine Demonstration Project, and the Hydrogen and Ethanol Transportation Fuel and Infrastructure Strategy.

B) Cross-Sectoral Actions: Framework and Partnership Actions

Under the First National Business Plan, a number of programs were designed to encourage governments and non-government entities, across all sectors, to undertake substantive climate change-related activities. These strategic opportunities included forums that encourage the implementation and reporting of voluntary activities, mechanisms to explore aspects of emission trading, industrial energy efficiency and conservation initiatives, and the establishment of a government-sponsored emission reduction registry designed to reduce future business uncertainty and encourage further early actions.

Business Plan 2002 builds upon the preceding initiatives and seeks to: expand the level of public and private sector commitments to voluntary actions; create greater opportunities for partnerships among governments, stakeholders and strategic sectors; and, take maximum advantage of international mechanisms that provide opportunities to achieve domestic GHG emission reductions and contribute to cost-effective global reductions.

Even with the broad participation in these initiatives to date and the establishment of an effective national baseline protection program, it is recognized that industries may have difficulties making the significant investments necessary to substantially reduce GHG emissions or sequester carbon, unless there is an effective business case for making such investments. Therefore, Ministers of Energy and the Environment concluded that provision would have to be made for some type of economic inducement to make such investments. In preparation for this, a Pilot Emission, Removals, Reductions and Learnings initiative was introduced.

A new undertaking introduced with this Plan is a process to coordinate and advance research into the effects of climate change on the health and well being of Canadians. As the physical and economic effects of climate change are being studied for specific regions and sectors, so too must we understand the health effects of more extreme weather events and longer-term changes to Canada's weather patterns. To further the development of Canada's health policies, governments will work closely with non-government partners to explore climate change-related health risks and the co-benefits that may be achieved through mitigation and adaptation strategies.

Objectives and Supporting Actions

a) To enhance frameworks encouraging voluntary commitments, action and results.

b) To remove policy barriers to voluntary GHG emission reductions.

c) To encourage and support trading of voluntary GHG emission reductions.

d) To assist in positioning Canadian companies to compete internationally, to export technologies and invest in international GHG reductions/offsets.

e) To facilitate multi-sectoral partnerships to promote communication, best practices, cross-sectoral demonstration and pilot projects, and cross-sectoral investment.

f) To engage health and social policies and programmes across Canada to manage risks to health and well-being from climate change.

The supporting actions for these objectives are further described in the following sub-sections

Objective a)

To enhance frameworks encouraging voluntary commitments, action and results.

a) Voluntary Challenge and Registry

The Voluntary Challenge and Registry (VCR) is Canada's only publicly accessible national registry of voluntary greenhouse gas baselines, targets, and reductions based on individual entities and/or facilities. The Registry records the actions planned and executed by registrants, providing them with the opportunity to exchange information and to share best practices with their peers. Any entity with operations in Canada can register an Action Plan and provide subsequent Progress Reports.

The number of documents posted in the Registry has increased to about 1700. More than 785 Action Plans are currently registered, and almost half of those have been followed up with regular Progress Reports. These reports can be viewed in their entirety by accessing the Challenge Registry within the VCR Inc. web site **(http://www.vcr-mvr.ca/vcr-002.cfm)**. They may be browsed by entity name, by geographic location, by sector, and by report type.

In 2001, in conjunction with a set of Public Service Announcements, VCR Inc. initiated the first steps of its Individual Action Registry. Individuals or small to medium-sized entities can progress through a complete on-line registration to develop an action plan that estimates the GHG impact of their activities.

The level of reporting across all sectors has continued to improve through those 208 entities that have achieved Champion level reporter status and through the work of Champions in Action. During the fall of 2001, VCR Inc. directly contacted those 263 registrants that had not submitted a progress report in over two years. Of these, 25 sent in an updated report, 22 verbally committed to send a plan in the future, and 91 requested a registration update package. Thirty one registered entities were deleted from the Registry in 2001, primarily due to mergers, acquisitions, and closures.

In 2001, the federal government and several provincial and territorial governments reported their related activity to either the VCR Inc. or ÉcoGESte.

Objective b)

To remove policy barriers to voluntary GHG emission reductions.

b) Baseline Protection Initiative (BPI)

Federal, provincial and territorial governments implemented the Baseline Protection Initiative (BPI), to help remove disincentives to take early action on climate change in a changing policy environment.

The BPI is intended to reduce uncertainty for business and to facilitate long-term corporate planning. It ensures that businesses that take early actions to reduce GHG emissions will not be disadvantaged if future policy actions allocate obligations to reduce GHG on the basis of emissions levels. If a future policy allocates emissions rights or reduction obligations on the basis of emissions levels, BPI allows businesses and institutions to reconstruct their emissions baselines to include reductions in emissions achieved through investment in early actions. To be eligible for the BPI, an emissions reduction must have taken place on or after January 1, 1990, at a participant's site(s) in Canada, and must result in real, measurable, and verifiable reductions. More information on BPI can be found by accessing the Baseline Protection Initiative website via www.nccp.ca.

The integrated and seamless on-line registration capacity that was developed between Natural Resources Canada's Office of Energy Efficiency (which houses the BPI), ÉcoGESte and VCR Inc. were launched on April 10, 2002. The launch followed a year of work focused on setting up the necessary governance and structure to allow the development of an effective system. New BPI products include a Reference Manual, updated communications products, a BPI Work Plan and work on addressing issues such as BPI treatment of Demand Side Management, reduction action validation, and linkage with Domestic Emissions Trading.

Objective c)

To encourage and support trading of voluntary GHG emission reductions.

c) Pilot Emission, Removals, Reductions and Learnings (PERRL)

At their Joint Meeting in October 2000, federal, provincial and territorial Ministers of Energy and the Environment directed officials to develop a detailed program for cost-shared pilots that would use public funds to purchase emission reductions in certain strategic areas (such as, landfill gas, renewable energy, biological carbon sequestration and geological capture and storage).

The proposed initiative will:

- assist and encourage action to achieve incremental GHG emissions reductions in identified strategic areas;
- demonstrate and develop Canadian expertise in achieving net GHG emission reductions in identified strategic areas;
- inform the analysis and development of future policy responses from the learnings gained.

Actions Approved and Underway

Objective c: *To encourage and support trading of voluntary GHG emission reductions.*

Emission Reduction Trading and Emission Caps for the Electricity Generating Sector [Ref. 2002 - 250]

Ontario

Electricity sector emission caps took effect January 1, 2002. When fully implemented in 2007, the limits will cut NOx emission from fossil fuel plants by 53% and SO_2 by 25%. To support these caps, Ontario also introduced an emission reduction trading system with special incentives for conservation and renewable energy. The regulation will provide all Ontario businesses and municipalities with an incentive to reduce air pollution and improve air quality. Although GHG emissions are not specifically targeted, GHG emission reductions are expected as the NOx and SO_2 limits improve the competitive position of cleaner fuels and technologies. (Ontario Ministry of the Environment)

In partnership with the electricity sector and other industries.

Greenhouse Gas Emission Trading [Ref. 2002 - 292]

Yukon

To generate a bank of greenhouse gas emissions credits from energy efficiency and renewable energy activities displacing fossil fuels, and to sell these credits so revenues may be re-invested in similar activities. The initiative involves developing local expertise in the emerging emissions market to help identify potential purchasers and ensure that any sale is best-positioned for future recognition by government or related agency. (Yukon Development Corporation)

In partnership with the Canada-Yukon Energy Solutions Centre and Yukon Energy Corporation.

Emissions Trading [Ref. 2002 - 046]

EPCOR Utilities Inc.

To meet voluntary commitments, learn through the process, demonstrate the effectiveness of emissions trading in reducing emissions and mitigate risk of climate change. On its own and through a consortium approach, EPCOR has completed and is negotiating several trades for verified emission reductions. EPCOR has a screening tool and set of criteria by which all potential opportunities are evaluated.

In partnership with (GEMCo) - KEFI Exchange - Emissions Marketing Association

Emission Reduction Market Mechanisms[Ref. 2002 - 037]

CleanAir Canada Incorporated

To be a leading contributor in the development, operation and expanded use of local and global emissions reduction market mechanisms in Canada. Using a Learning by Doing approach which draws on the expertise of the voluntary contributors through a collaborative process.

1. Design & Analysis: Discussion and resolution of market mechanism issues.
2. Review Management: Establishing the criteria for project reviews and conducting assessments on each project.
3. Registry: Design and operation of a central registry for GHG reductions.
4. Education & Outreach: Presenting results and learnings to the industry, the government and the general public.

Alberta Greenhouse Gas Emissions Trading Simulation [Ref. 2002 - 260]

Alberta

The creation of a Greenhouse Gas emissions trading simulation that would help participants understand the impacts that alternative regulatory policies can have on the cost of compliance for Alberta firms operating in North American and global markets. The event brought together participants from industry, government and environmental groups to experience a simulated greenhouse gas-trading environment.

In partnership with Climate Change Central, CO_2e.com, ATCO Power, EPCOR, Shell Canada, Suncor Energy, TransCanada PipeLines, U of Calgary Learning Commons, and Western Economic Diversification.

Greenhouse Gas Solutions Showcase [Ref. 2002 - 259]

Alberta

To develop a website that will be an online catalogue of products and services designed to benefit both buyers and sellers of greenhouse gas reduction solutions. The virtual showcase focuses on agriculture, commercial and residential buildings, mining, forestry, oil and gas, petrochemicals and utilities. A panel of experts from the environmental, research and legal communities reviews solutions prior to their incorporation on the Climate Change Central website.

In partnership with Climate Change Central, Environmental Services Association of Alberta, Alberta Economic Development and Western Economic Diversification.

Actions Under Consideration

Industrial Market Signals Strategy [Ref. 2002 - 256]

Pembina Institute/ David Suzuki Foundation

To develop a proposal seeking the introduction of a tax on coal, as an initial step, to adjust energy prices to better reflect carbon content of the different fuels. The proposal would also seek the introduction of a provision for a GHG emissions trading system that will provide energy efficiency incentives over the long term.

Objective d)

To assist in positioning Canadian companies to compete internationally.

d) Clean Development Mechanism and Joint Implementation

The Kyoto Mechanisms are of particular importance to Canada. The Clean Development Mechanism (CDM) and Joint Implementation (JI) are anticipated to assist Canada in achieving its Kyoto targets in a cost-effective manner.

Canada's CDM & JI Office (**www.dfait-maeci.gc.ca/cdm-ji**), the federal government's focal point for these Kyoto Mechanisms, has three objectives as established in Action Plan 2000. They are:

- to strengthen Canada's capacity to take maximum advantage of the Kyoto Mechanisms;
- to encourage and facilitate Canadian participation in the Kyoto Mechanisms by promoting awareness, cost-effective opportunities, and lowering transaction costs while engaging developing countries and countries-in-transition in CDM and JI activities;
- to assist Canadian entities in obtaining emission reduction credits from CDM- and JI-type projects according to international rules and guidelines.

Canada's CDM & JI Office has significantly increased its activities in 2001-2002. It has:

- concluded 35 contracts and contribution agreements (including nine baseline studies, six country-specific market studies and four feasibility studies);
- trained embassy staff who manage political, trade, and development issues;
- signed MOUs with Colombia, Uganda and Chile and begun discussions on MOUs with eight other countries;
- participated in conferences in Russia;
- delivered CDM Roundtables in nine countries (Colombia, Ecuador, Chile, Argentina, Uruguay, Mexico, Morocco, Tunisia, Jordan); and,
- conducted significant outreach activities in China and India, including representatives from Bangladesh, Bhutan, Nepal and Sri Lanka.

Domestically, the Office has facilitated Workshops and Roundtables within Canada including:

- a National CDM & JI Workshop;
- the Globe 2002 International CDM & JI Workshop (with Industry Canada);
- the Globe 2002 Trade Commissioner CDM & JI Training Workshop; and,
- five Regional CDM & JI Workshops.

Canada's CDM & JI Office will continue with international and domestic activities in order to encourage and facilitate participation in the CDM and JI project initiatives.

Approved and underway

Objective d: *To assist in positioning Canadian companies to compete internationally.*

Energy and Environmental Technologies Workshop in Sao Paulo, Brazil [Ref. 2002 - 157] — *Canada*

To participate in a workshop promoting Canadian clean energy solutions to address Brazil's energy needs. The Canadian Delegation would also attend Networking meetings with potential strategic partners in Brazil. (Industry Canada)

Canadian Initiative for International Technology Transfer [Ref. 2002 - 315] — *Canada*

The Canadian Initiative for International Technology Transfer will help identify and develop Canadian climate change technology projects for demonstration in developing countries. The focus will be on the commercial and capacity building aspects of projects. This Action Plan 2000 initiative will assist companies who seek funding for demonstration projects from existing climate change programs. (Natural Resources Canada)

(2001/02 - $182K; 2002/03 - $1.0M; 2003/04 - $928K; 2004/05 - $512K; 2005/06 - $310K)

Posting of Climate Change Technology Promotion Officers [Ref. 2002 - 316] — *Canada*

To help the Canadian industry market their climate change technologies and expertise, Climate Change Technology Promotion Officers will be posted in India, Mexico and Poland as part of a five-year pilot program (an Action Plan 2000 initiative). The officers will offer a broad range of services, such as information on market prospects, key contacts, local companies, visit arrangements, face-to-face briefings and troubleshooting. (Natural Resources Canada)

(2001/02 - $261K; 2002/03 - $596K; 2003/04 - $582K; 2004/05 - $695K; 2005/06 - $590K)

Federal Showcasing - Canadian Environmental Solutions (CES) [Ref. 2002 - 156] — *Canada*

To showcase and profile Canadian climate change technologies to both domestic and international audiences by furthering the development of the Canadian Climate Change Solutions (CCCS) CD and web site (an Action Plan 2000 initiative). Through strategic marketing to target clients, the CCCS will raise awareness of Canadian competitive advantage and leadership in climate change technologies and provide a single window to export-ready Canadian climate change technologies. (Industry Canada)

Climate Change Workshops and Missions [Ref. 2002 - 152] ***Canada***

To support the development of climate change technology transfer projects overseas and the expansion of market opportunities for Canadian companies (an Action Plan 2000 initiative). Workshops and missions dedicated to climate change issues, industries and technologies will be organized to serve as a forum to encourage and build effective partnerships with other nations to help reduce GHG emissions through CDM/JI projects. (Industry Canada)

International market Analysis [Ref. 2002 - 317] ***Canada***

To support many of the international initiatives, a market analysis of mid and longer-term technology needs of international markets will be conducted to provide the tools to respond to future needs of Canadian investors and help guide domestic R&D programs, so investments have international commercial potential (an Action Plan 2000 initiative). (Natural Resources Canada)

(2001/02 - $55K; 2002/03 - $305K; 2003/04 - $310K; 2004/05 - $310K; 2005/06 - $310K)

Statistical Monitoring of Climate Change Technologies [Ref. 2002 - 155] ***Canada***

To determine the supply and demand of climate change technology solutions and identify barriers to innovation and the growth of export of climate change technologies. The classification of climate change technologies and practices to be developed with the guidance and input of the Working Group on measuring climate change technologies. (Industry Canada)

Actions Under Consideration

Climate Change Mission To South America [Ref. 2002 - 161] ***Canada***

To promote trade / export growth of Canadian Climate Change Technologies to South America. Trade Team Canada Environment mission to country(ies) in South America. (Attendance at workshops and business meetings). (Industry Canada)

Objective e)

To facilitate multi-sectoral partnerships to promote communication, best practices, cross-sectoral demonstration and pilot projects, and cross-sectoral investment.

e) Multi-sectoral Partnerships

Under this objective, jurisdictions are building and maintaining effective partnerships and acting as catalysts for municipalities, businesses, institutions and individuals, and non-governmental organizations to take effective action on climate change. This activity includes the formation of multi-sectoral advisory committees to facilitate partnerships.

Objective f)

To engage health and social policies and programs across Canada to manage risks to health and well-being from climate change.

f) Health and Well-being

As a result of climate change, we anticipate experiencing more extreme weather patterns such as heat and cold waves, storms, droughts and floods which can affect our health and well-being. A warmer climate and its more extreme weather patterns can bring about an increase in illnesses such as asthma and allergies, respiratory and cardiovascular stress, especially in people who are not in good health, who work outdoors or in hot environments, in the elderly, and in the young. We, therefore, need to better understand how climate change can affect our health and well-being, and how we can best manage the risks which result from a changing climate.

Health and well-being issues related to climate change bridge all sectors including agriculture, buildings, electricity, forestry, industry, municipalities and transport. The broad range of human health and well-being impacts of climate change touch directly or indirectly on all of these sectors. For example, destruction of buildings and structures by extreme weather events or the economic dislocation in a region due to the damage to a natural resource base (e.g., forestry, agriculture) impact on the health and well-being of Canadians. Additionally, while some GHG mitigation measures may have important human health co-benefits, such as actions that reduce air pollution, other tools and new technologies may have important environmental and health concerns which need to be investigated.

Climate change is important to the public health sector because of the potential impacts and adaptive requirements it may impose on health and social infrastructure in Canada. Increased illnesses and deaths resulting from climate change will put an added strain on the public health care system as more people seek medical attention. The degree to which this occurs will, in part, depend on how quickly public health authorities integrate climate change considerations into their policy making.

Efforts by the various levels of government and by private enterprise are already underway to conserve energy, and to limit and reduce emissions of greenhouse gases that cause climate change. Although this is expected to slow down the changes in the future, impacts from climate change are inevitable; in fact, its more extreme weather patterns are being felt already and will continue.

Health Canada facilitates research to produce the knowledge and evidence needed for sound public health policies to cope with the effects of climate change. One of its priorities is to lead the development of the research agenda on climate change and human health and well-being. This is being accomplished through mechanisms such as regular climate change and health scientific and policy research conferences and workshops and development with the World Health Organization and other partners of International Guidelines on Health Impact Adaptation Assessment from Climate Change.

As well, Health Canada works with all levels of government, with researchers and policy makers, and with private sector and community organizations to integrate health considerations into health policies related to climate change. The Climate Change and Health Policy Forum and related workshops will bring together regional policy networks of public health governmental and non-governmental partners to discuss plans and options for adaptation activities at regional and sectoral levels. The department will also support an International Meeting of Ministries of Health on Climate Change to develop a global climate change and health policy and planning agenda. Health Canada will foster partnership building and the communication of the health risks associated with a changing climate through its website and through climate change and health information tool-kits designed for public health officials.

Objectives and Supporting Actions

a) To facilitate and coordinate a collaborative policy and planning agenda to engage health and social policies and programs across Canada to manage risks to health from climate change.

b) To facilitate and coordinate a science and policy research agenda and extramural funding for health and climate change.

c) To develop and coordinate partnerships and public engagement on health and climate change issues.

Results Anticipated

- Increased knowledge of the impacts of climate change on human health, as well as the human health costs and benefits of GHG mitigation actions;
- Acceptance of the need for human health and climate change adaptation policies, including development of plans and options for action at regional and sectoral levels;
- Increased collaboration and cooperation nationally and internationally by governmental and non-governmental public health officials in efforts to integrate climate change considerations into health and social policy development.

Approved and Underway

Objective a: *To facilitate and coordinate a collaborative policy and planning agenda to engage health and social policies and programs across Canada to manage risks to health from climate change.*

Objective b: *To facilitate and coordinate a science and policy research agenda and extramural funding for health and climate change.*

Objective c: *To develop and coordinate partnerships and public engagement on health and climate change issues.*

Climate Change and Health Policy and Planning Agenda [Ref. 2002 - 175]

Canada

To facilitate and coordinate a collaborative policy and planning agenda, to engage health and social policies and programs across Canada and to manage risks to health from climate change. Plan, convene, and conduct biennial Climate Change and Health & Well-being National Policy Fora for governmental and non-governmental public health partners to advance the knowledge of climate change impacts on human health, and to develop health and social policies designed to reduce the population health impacts of climate change and of climate variability.

In partnership with federal/provincial/territorial and municipal government health officials, non-governmental organizations, scientific and public health researchers, research funding agencies, and engaged national and international organizations.

Climate Change and Health Policy and Research Knowledge Dissemination [Ref. 2002 - 191]

Canada

To develop and coordinate partnerships and public engagement on health and climate change issues. Health Canada fosters partnership building and the communication of the health risks associated with a changing climate through its website and through climate change and health information tool-kits designed for public health officials.

In partnership with Universities, federal departments, federal/provincial/territorial and municipal public health authorities, non-governmental organizations, research funding agencies.

Climate Change and Health Policy and Research Networks [Ref. 2002 - 189]

Canada

To facilitate the coordination of partners supporting health & well-being, of climate change programme collaboration and of policy development through the development of public health policy networks and health issue research networks. (Health Canada)

In partnership with Universities, federal/provincial/territorial and municipal public health authorities, non-governmental organizations, research funding agencies and other appropriate stakeholders.

C) Cross Cutting Actions

This section provides a brief overview of three areas that have been identified in the past as significant potential in terms of future action to reduce net GHG emissions. The three highly promising areas for reducing net emissions are sinks, CO_2 capture and geological storage, and renewable energy. Specific initiatives to advance these three areas are found in a number of sections under this business plan, as identified below.

a) Sinks

A sink is a process or an activity that removes a GHG from the atmosphere. Carbon dioxide is removed by plants through photosynthesis and stored in forests, croplands, grasslands and wetlands. These biological sinks can be enhanced through selected management practices for forests and farms, such as the use of no-till seeding in agriculture.

Carbon sinks offer a unique opportunity to offset between 20 and 40 Mt of Canada's GHG emissions per year in the first commitment period, based on current estimates of existing activity and possible further effort.

Considerations

- Forestry (non-industrial aspect) and agriculture are the main sectors affected. Investments in the sinks potential of agricultural soils are occurring both within and outside of Canada, with the private sector demonstrating workable frameworks to increase the generation of sinks.
- The electricity sector has taken a keen interest in investment in sinks options, as a means to mitigate its emissions from electricity generation.
- Municipalities have also expressed some interest in sinks in the context of urban forestry.
- Some provincial governments have begun to encourage significant investment in sinks as part of their response to climate change.
- Investment in forest and agricultural carbon measurement systems is on-going.

Many actions to promote the development of sinks that are approved and/or under consideration are included in the agriculture and forestry sectors covered in this Business Plan.

b) CO_2 Capture and Geological Storage

Capture and Geological Storage of CO_2, in general terms, involves the capture, treatment, transportation and injection of CO_2 into a suitable geological medium. In this process, CO_2 is first captured from a suitable source, such as an off-gas stream at a petrochemical processing facility or a flue-gas stream from a coal-fired electricity generation facility. The CO_2-bearing gas stream may need to be purified and then transported to the storage site where it is injected into the selected geological medium. Where the geological medium is an oil reservoir, the injection of the CO_2 may have the additional benefit of enhancing oil production. In other cases, such as with saline aquifers, the CO_2 is injected for storage purposes only.

Capture and Geological Storage of CO_2 is not equally applicable in all situations. It is most effective and efficient when applied on a large scale to CO_2 produced in large volumes from stationary, single point sources relatively near to suitable long-term storage sites. It, therefore, has obvious application to CO_2 produced from fossil fuel (particularly coal) fired electricity generation facilities in areas where large storage sites exist (particularly in Alberta and southern Saskatchewan).

Considerations

- The use of CO_2 for enhanced oil recovery offers the environmental benefit of emissions reduction and the economic benefit of extending the production life for several oil fields.
- The CO_2 Capture and Geological Storage may also eliminate emissions of other pollutants (e.g., particulates and NOx).
- The emissions from sources of carbon dioxide (CO_2) readily amenable to capture and storage could easily exceed 50 megatonnes per year.

Key objectives and priorities for future actions are:

a) To ensure, through government/industry partnerships, that geological capture and storage is a viable option for reducing Canada's CO_2 emissions;

b) To undertake the necessary preparatory work, including addressing regulatory and fiscal barriers, and developing inventories of suitable source and storage sites;

c) To support the expanded use of geological capture and storage in Canada, beginning with CO_2-based enhanced oil recovery, and proceeding to "flue" gas type sources and CO_2-enhanced coal bed methane recovery; and

d) For governments and industry to co-operate closely in advancing CO_2 Capture and Geological Storage.

Actions to advance the use of geological capture and storage that are approved and/or under consideration are included in the Technology, Electricity and Industry (Oil and Gas) sections of this Business Plan.

c) Renewable Energy

"Renewable" energy can be defined as energy derived from renewable resources: wind, water, sun, earth, residues and biomass, and includes two specific features: self-generation by cycle and not depleted. Liquid biofuels (such as ethanol and biodiesel) are also considered renewables since they can be derived from sustainable biomass sources.

Considerations

- The advantage of using renewable energy sources stems from the fact that they arise as part of a renewable carbon cycle and thus result in low carbon emissions.
- Fuel-switching to renewable energy can make a significant contribution towards meeting climate change objectives.
- Large scale production of power using wind, water, solar or biomass sources could partially offset fossil-fuel generated electrical power.
- Large scale production of liquid fuels using biomass (such as ethanol) could replace some of the fossil fuels used in transportation.
- Bioenergy products from agricultural and forestry biomass and waste products are renewable energy sources. Biofuels include liquid fuels such as ethanol, methanol, biodiesel (vegetable oil methyl esters) and wood pyrolysis oil. Land fill gas can also be included in the 'bio' categories.
- From the feedstock production stage (forestry and agriculture sectors) to energy utilization (manufacturing, transportation and energy sectors), advancing bioenergy provides many opportunities for various sectors.
- Most renewable energy sources yield lower GHG emissions than gasoline or other fossil-based fuels, on a life-cycle basis, and are therefore attractive measures for many sectors to help meet emissions reduction targets.
- To capture a significant portion of the market, hurdles related to costs (relative to fossil fuels), lack of infrastructure and technical challenges must be overcome.

Actions to advance the use of renewable energy sources that have been approved and/or are under consideration are included in the Electricity and Transportation sections of this Business Plan.

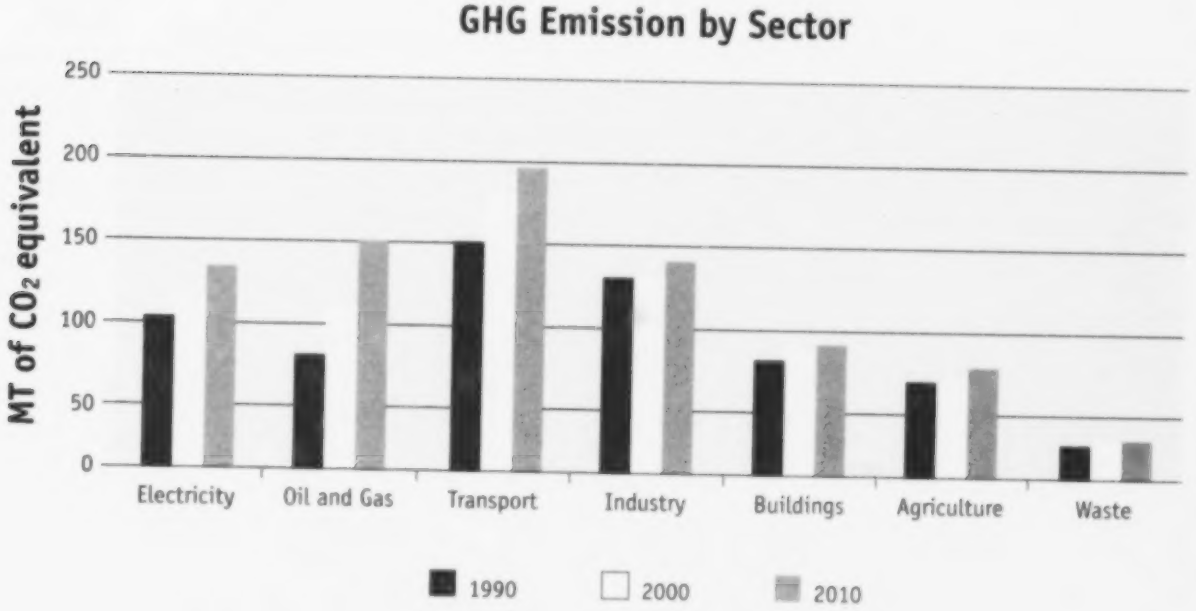
APPENDIX A

Canada's GHG Emissions – Current and Projected

Canada's greenhouse gas emissions in 1999, the most recent year for which figures are available, were equivalent to 699 megatonnes of carbon dioxide (CO_2). This level of emissions is 15 per cent higher than the 1990 level of 607 megatonnes and 22 per cent higher than Canada's Kyoto target of 571 megatonnes. Although emissions have been rising since 1990, the upward trend is slowing down (for example, 1.4 per cent growth between 1998 and 1999 versus over 3.0 per cent in 1994). In comparison, over the 1990 to 1999 period, Canada's Gross Domestic Product grew nearly 25%, while domestic energy consumption grew at half that rate, i.e.13 per cent (and emissions by 15 per cent).

Factors affecting emissions growth in recent years include increases in coal consumption for electricity generation and growth in fossil fuel production, largely for export, and increases in Canadian transportation energy consumption.

Net carbon dioxide *removals by sinks* associated with the land-use change and forestry sector declined substantially since 1990 to an estimated 20 megatonnes in 1999. The removals by sinks are not included in the accounting of the national inventory total of 699 megatonnes. Under the terms of the Kyoto Protocol, net removals by sinks will be accounted for separately during the First Commitment Period (2008-2012).

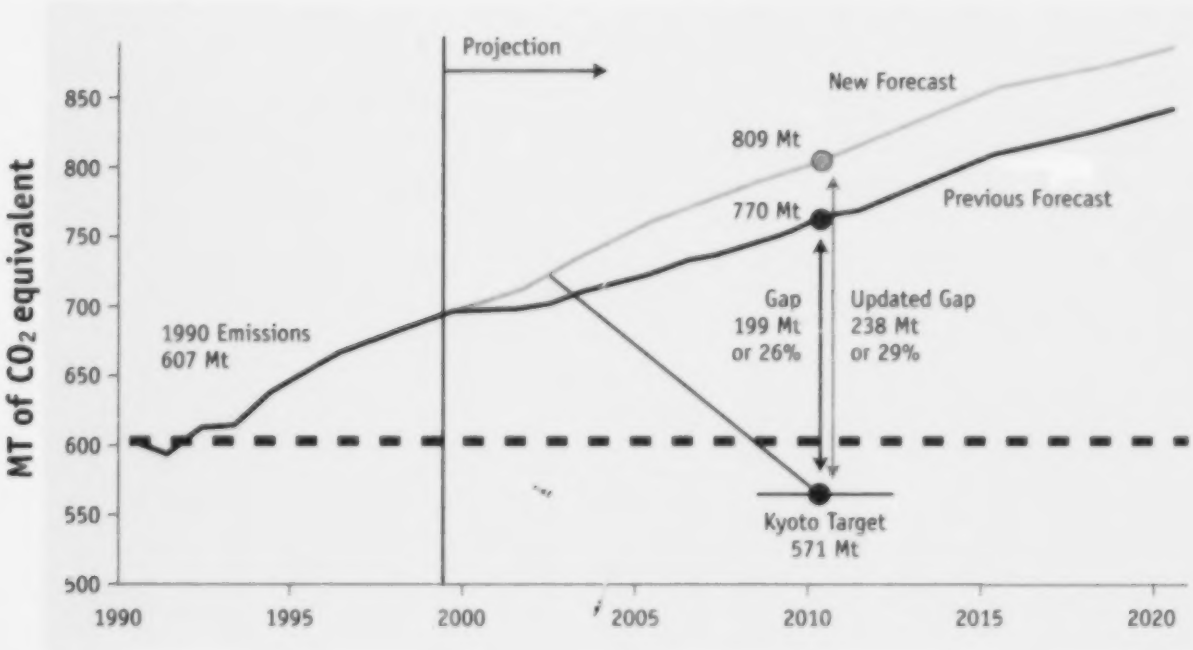


On a sectoral basis, electricity and petroleum industries account for 36 per cent of the total national emissions (253 megatonnes) and transportation accounts for 25 per cent (177 megatonnes). Industry had a 6 per cent decrease in emissions between 1990 and 1999, despite increases in production and related GDP. The reduction in emissions is largely due to a decline in process emissions from adipic acid production, as well as increased energy efficiency and fuel substitution. The other sectors of the economy (residential, commercial, institutional, agriculture and waste) accounted for 157 megatonnes, or 22 per cent of the total emissions. Those sectors, however, contributed only 8 per cent of the total emissions growth over the 1990-1999 period.

In the absence of new (post-1999) policy and program initiatives by governments, greenhouse gas emissions could potentially reach 809 megatonnes in 2010. This estimate would represent a required reduction of 29 per cent if Canada were to meet its Kyoto target.

Higher emissions from fossil fuel production account for more than half of the projected increase to 2010. Emissions from transportation and electricity are the next largest contributors.

Projected GHG Emissions and the Kyoto Target



National
Climate
Change
Process